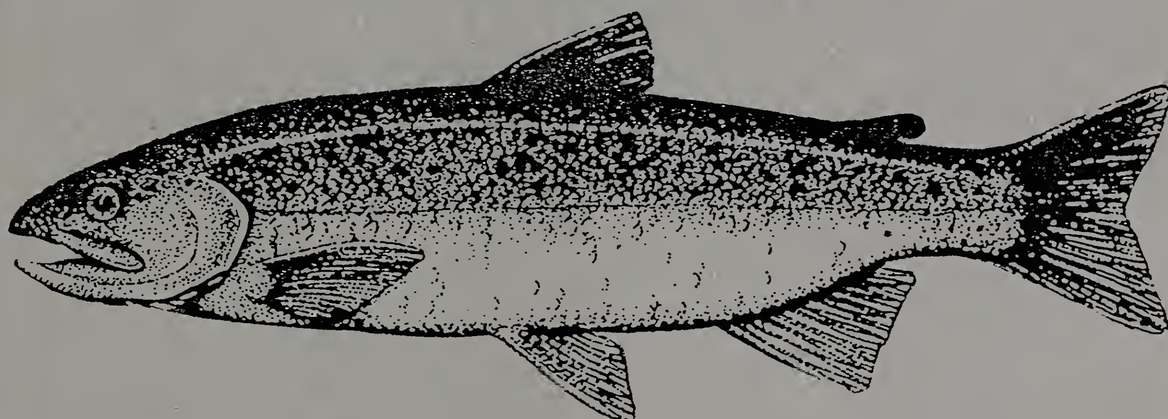
Draft Environmental Impact Statement for the Main Bay Salmon Hatchery Expansion

Prince William Sound
Chugach National Forest
Alaska



August 1993

United States Department of Agriculture | Forest Service | Chugach National Forest | Glacier R. D.
P.O. Box 129
Girdwood, Ak 99587

Reply To: 1950

Date: August 16, 1993

Dear Friend of the Chugach National Forest:

Prince William Sound Aquaculture Association has contracted with Dames & Moore Co. for the preparation of this Draft Environmental Impact Statement (DEIS) for the expansion of the Main Bay Salmon Hatchery in western Prince William Sound.

The purpose of this DEIS is to provide information to public officials and citizens before a decision is made and to give an opportunity to comment on the proposed action. The Regional Forester will select an alternative to implement from the Final Environmental Impact Statement (FEIS) and document the decision in a Record of Decision. We anticipate the FEIS and Record of Decision will be published at the end of the year.

Three alternatives were developed and analyzed in detail, including the No Action alternative. Alternative 1 is proposed for implementation. Alternative 1 focuses on the expansion of the existing hatchery site and facility from the current production of 5.1 million sockeye salmon smolts to 20 million smolts.

We are seeking public comment before issuing the FEIS. This document is our invitation for your participation in the process to prepare the environmental impact statement. We would appreciate and can best respond to the comments on the DEIS if they are as specific as possible and address the adequacy of the analysis and the merits of the alternatives.

In order to ensure incorporation of your comments in the FEIS, your comments and responses must be received by the close of business October 4, 1993. After the comment period ends on October 4, 1993, the comments will be analyzed and considered in preparing the FEIS. Your comments should be sent to John Dorio, Glacier Ranger District, P.O. Box 129, Girdwood, Alaska 99587

We look forward to receiving your comments on the DEIS.

Sincerely,

John C. Dorio

JOHN C. DORIO
Glacier District Ranger

Main Bay Hatchery Expansion
Draft Environmental Impact Statement
Prince William Sound, Alaska

U.S.D.A. Forest Service
Chugach National Forest

Lead Agency:	Alaska Region U.S.D.A. Forest Service Chugach National Forest 201 East Ninth Avenue Anchorage, Alaska 99501
Responsible Official:	Michael A. Barton Regional Forester Alaska Region
For Further Information, Contact:	John Dorio, District Ranger or Elaine Gross, Project Leader U.S.D.A. Forest Service Chugach National Forest Glacier Ranger District Post Office Box 129 Girdwood, Alaska 99587

Reviewers must provide their comments to the Forest Service during the draft environmental impact statement review period ending October 4, 1993. This will enable the Forest Service to analyze and respond to the comments at one time and to use information acquired in the preparation of the final environmental impact statement, thus avoiding undue delay in the decision making process. Reviewers have an obligation to structure their participation in the National Environmental Policy Act process so that it is meaningful and alerts the agency to the reviewers' position and contentions. Vermont Yankee Nuclear Power Corp. v. NRDC, 435 U.S. 519, 533 (1978). Environmental objectives that could have been raised at the draft stage may be waived if not raised until after completion of the final environmental impact statement. City of Angoon v. Hodel (9th Circuit, 1986) and Wisconsin Heritages, Inc. v. Harris, 490 F. Supp. 1334, 1338 (E.D. Wis. 1980). Comments on the draft environmental impact statement should be specific and should address the adequacy of the statement and the merits of the alternatives discussed (40 CFR 1503.3).

Abstract: The Chugach National Forest proposes to modify an existing special use permit to allow expansion of hatchery production of sockeye salmon in Prince William Sound. Three alternatives are addressed in detail in this EIS: (1) No Action, (2) Expansion of the Main Bay Hatchery, and (3) Expansion of the Esther Island Hatchery. Ten other alternatives were considered but found to be infeasible. The Forest Service has identified the Expansion of the Main Bay Hatchery as the preferred alternative.

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SUMMARY

SUMMARY

Introduction

The Chugach National Forest is proposing to modify an existing special use permit issued to the Alaska Department of Fish and Game (ADF&G) to respond to a Prince William Sound Aquaculture Corporation (PWSAC) proposal for expansion of the existing sockeye salmon hatchery facility at Main Bay, Alaska. The hatchery is located within the Nellie Juan-College Fiord Wilderness Study Area which was established in the Chugach National Forest by Section 704 of the Alaska National Interest Lands Conservation Act (ANILCA) of 1980. The existing hatchery is currently operating under a Forest Service special use permit which allows "fishery research, management, enhancement, and rehabilitation activities within national forest wilderness and wilderness study areas" (Section 704 of ANILCA).

The proposed hatchery expansion would allow an increase in production from 5.1 to 20 million sockeye salmon smolts. This would bring production from one million up to approximately four million adult sockeye salmon. The proposal would produce an estimated total common property fishery revenue of approximately $30 million, and a hatchery revenue of $15 million. The fishermen would in turn pay approximately $560,000 in taxes to the State of Alaska.

The expansion plan calls for the addition of a hatchery building, a power house, a duplex residence, a bunk house, and a small warehouse. The additions would be constructed on existing and new gravel fill within the confines of the current special use area of approximately 35.2 acres. The hatchery would incubate eggs from sockeye salmon stocks from Eyak, Coghill, and Eshamy lake systems. This development would require permits for construction and operation from agencies of both the Federal and State governments.

Alternatives

A total of 13 alternatives including a No Action alternative were considered. The proposed alternative is the expansion of the Main Bay Hatchery. This expansion would increase the production of sockeye salmon smolt from the current level of 5.1 million smolts to 20 million smolts by the year 2001. The existing production at this hatchery was originally initiated to increase inconsistent salmon returns to the Eshamy Fishing District which had been open only sporadically between 1965 and 1985. The Main Bay Hatchery was chosen for expansion because of its proximity to the existing fishery and because it would be producing only sockeye salmon, thus minimizing spread of infectious hematopoietic necrosis (IHN) virus to other species. The hatchery facility would partition stocks and individual spawning groups to prevent the spread of disease. The proposed expansion would provide for production of 20 million sockeye salmon smolts for release in Eshamy, Coghill, Main Bay, plus several other potential release sites in order to maintain a regular output of renewable resources with the purpose of enhancing the common property fishery and to provide a more equitable distribution among the various fisheries.

A second alternative analyzed in detail was the expansion of the Wally Noerenberg Esther Island Hatchery on Lake Bay along the southern shore of Esther Island. This alternative is located on State of Alaska lands surrounded by the Nellie Juan/College Fiord Wilderness Study Area of the Chugach National Forest, and has attributes, such as adequate construction space and water supply, that would qualify it for detailed study. Because of IHN viral infection concerns, sockeye salmon would be incubated in a separate facility at the hatchery site. Under this alternative, approximately 9.4 million fry would be reared, producing an adult return of approximately 1-1.2 million. This would yield an estimated $7.5 million to the seine, drift gillnet, and set gillnet commercial fisheries.

A third No Action alternative was also analyzed. Under this alternative the special use permit would not be modified and the Main Bay Hatchery would continue to produce approximately one million adult sockeye salmon and the Esther Island would continue its current production of 1.3 million pink salmon.

Ten additional alternatives were considered during the analysis process. These alternatives included expansion of existing facilities as well as new construction at undeveloped sites. These were eliminated from detailed study because they failed to meet minimal qualifications including economic feasibility, water supply capabilities, water quality needs, spatial considerations, cost-recovery considerations, or fisheries management concerns.

Affected Environment

For each action alternative, environmental qualities including wetlands and vegetation, fish and wildlife, hydrology and water quality, air quality and noise, wilderness and visual quality, cultural resources, land use and ownership, socio-economics, commercial fisheries, recreation, and subsistence were addressed.

The action alternatives considered for detailed study are in two separate but similar environments. As such, there is a significant overlap in habitat types and use patterns. Both action alternatives are in coastal Western hemlock-Sitka spruce forests. The Main Bay Hatchery is located in an area containing approximately 0.55 acres of wetlands of which 0.19 acres would be affected. The Esther Island Hatchery is located on gravel fill over an intertidal zone and on uplands. The fish and wildlife inhabiting the vicinity around both hatcheries is typical for northwestern Prince William Sound.

Main Bay Hatchery utilizes Main Lake for its water supply. This lake exhibits low levels of hardness and must be treated with natural sea water prior to use in the hatchery. Floors, raceways, and hatchery equipment are disinfected with iodorphor or chlorine. This lake provides all the hatchery water needs with lake drawdown occurring most years in winter and/or spring months.

Esther Island Hatchery uses Esther Lake for its water supply. This lake is similar in water quality to Main Lake; the water is also treated prior to use in hatchery operations. The lake provides all hatchery and domestic water needs. Assuming water use of 40 cubic feet from

Main Lake, estimates indicate that since 1950 the average (maximum annual) lake drawdown would have been 5.7 feet. Drawdown would occur during winter and/or spring months of most years.

The air and noise quality at both the Main Bay and Esther Island hatcheries is affected by factors which are regional in scope. Such things as forest fires, exhaust and noise from airplanes and boats, and petroleum products used and released by boats constitute regional sources. Point sources would include diesel generators and incineration.

The Main Bay Hatchery site, as well as several off-site eggtake and remote release locations, are located within the Nellie Juan-College Fiord Wilderness Study Area (WSA) of the Chugach National Forest. The area is managed to maintain its wilderness character with the provision that fishery research, management, enhancement, and rehabilitation activities may be allowed. At Esther Island, the hatchery is located on lands administered by the State of Alaska; consequently, there would be no additional effect, at the hatchery site, on existing or proposed wilderness, or wilderness study area. Other off-site activities associated with the Esther Island Hatchery such as boat and plane transportation, and cost recovery (a fishery to help the hatchery recover the cost of operating) and eggtake operations may have an impact on the wilderness character of the WSA.

The visual quality of both alternative locations is similar. The Main Bay area is within the Chugach National Forest and has a Visual Quality Objective of Partial Retention, which requires that activities remain visually subordinate to the characteristic landscape. Esther Island is on lands administered by the State of Alaska; there is no visual quality objective for the landscape surrounding the hatchery.

Investigations in the vicinity of both the Main Bay and Esther Island hatcheries indicate that there are no known historical or archaeological sites. An archaeological literature search also indicated no previous sites.

The primary land uses of both action alternative locations are associated with the operations of the fish hatcheries, commercial fishing for cost recovery operations, sport fishing, recreation boating and kayaking. Commercial set net fisheries operate at shore sites along Main Bay.

The Main Bay Hatchery operates with a year-round staff of approximately 10, with increases up to 21 during the summer season. The Esther Island Hatchery operates with a year-round staff of approximately 10 people, including employees and families. During the summer months, the temporary work force ranges from 25 to 39 employees. Communities closest to the Main Bay and Esther Island hatcheries include Whittier, Seward, Cordova, and Valdez.

The Main Bay Hatchery currently produces sockeye salmon only. The existing facility will produce approximately one million returning adult salmon under full production. In 1991, the adult return was 467 thousand fish. During the same year, the Esther Island Hatchery

produced approximately 12.1 million pink salmon, 212 thousand chum salmon, 89 thousand coho salmon, and a small number of chinook salmon.

In 1991, total sockeye salmon production in Prince William Sound was 1.7 million fish. During 1991, the prices paid to fisherman for sockeye salmon averaged $1.00 per pound; however as recently as 1988, the average annual price was as high as $2.68 per pound.

Three popular recreational fisheries fall within the Main Bay alternative proposed locations: Knight Island Passage (saltwater); Eshamy Creek and lagoon (freshwater); and the Coghill River (freshwater). The Esther Island alternative encompasses only Eshamy Creek and lagoon, and the Coghill River. Both alternative locations are popular for motorized and recreational boating.

Subsistence harvesting is currently practiced near both hatchery sites as well as off-site locations used for eggtakes and releases of fry/smolt. Some subsistence harvesting occurs during commercial fishing activities. Chenega Bay, Tatitlek, Cordova, and Whittier represent communities dependant upon subsistence harvest. Valdez and Seward are not rural subsistence communities.

Environmental Consequences

For the Main Bay alternative, there would be selective removal of vegetation and expansion into approximately 8,000 square feet of wetlands. The Esther Island alternative is currently on gravel fill and no new clearing would be required.

Both hatchery sites have been in continuous operation for several years. Consequently, some displacement of wildlife has likely occurred and little or no additional permanent displacement is expected. For some species including black bears, gulls, and sea lions, the additional production at the hatcheries may act as a food source attractant. The effects of construction noise and activity at either site would be temporary.

Under both the Main Bay and Esther Island hatchery alternatives there would be a potential for impacts to wild stocks of Prince William Sound salmon. These impacts would be due to fishing pressure in a mixed stock fishery, genetic interactions between the stocks, disease introduction, and increased competition for food resources.

Both the Main Bay and Esther Island hatcheries rely on large, nearby lakes for freshwater. At Main Lake, servicing Main Bay Hatchery, the amount of drawdown varies considerably depending on the amount of rain fall. Estimates indicate that since 1950 the average drawdown is 5.7 feet occurring during the winter months. Assuming an average proposed demand of 40 cubic feet per second (cfs) at the Main Bay Hatchery, there would likely be measurable lake drawdown during drier years should the annual precipitation fall below the calculated average of 161 inches.

The Esther Island Hatchery, which utilizes water from Esther Lake would continue to operate within its permitted allocation of water, with drawdown occurring during the winter months of drier years.

Possible effects of construction noise on wildlife include interference with communication resulting in secondary effects on (1) navigation, (2) reproduction potential, (3) maintenance or establishment of contact with other group members, and (4) conveyance of messages such as distress or danger, presence of food and extent of territory.

Of the two action alternatives, only the Main Bay alternative is located within the Nellie Juan/College Fiord Wilderness Study Area. The Forest Service has recommended the area around Main Bay Hatchery as not suitable for wilderness designation; however, the area is managed under the provisions of the Wilderness Act pending Congressional action. Expansion of the Main Bay Hatchery would cause some further degradation of the natural character of the area by the addition of buildings and by human activity associated with eggtaking, release of smolts, and harvest of the returning fish.

The Esther Island Hatchery alternative is located in the Esther Island State Marine Park, an inholding within the WSA. The Marine Park is administered by the State of Alaska. Off-site activities associated with this alternative would affect the character of the surrounding WSA through increases in human activity associated with remote releases and eggtake activities.

The expansion of the Main Bay Hatchery facility would result in some moderate visual contrast. New structures would be situated behind or adjacent to existing structures, or would be screened from the bay by a large tree-covered rock outcrop. It is anticipated that visual contrasts would be evident, but subordinate in the characteristic landscape. New structures would be placed adjacent to existing ones and constructed of similar materials. The expanded hatchery would be visible only from the extreme head of the bay.

The Esther Island Hatchery alternative would be openly visible to boaters and other recreational users that visit Lake Bay. The visual contrasts are expected to be moderate since new structures would be placed near existing ones and constructed of like material.

Neither the Main Bay Hatchery or Esther Island Hatchery areas contain any known archeological sites or materials. Surveys were done during the construction phase of both hatcheries, and surveys were performed in Main Bay subsequent to the Exxon Valdez oil spill.

Both the Main Bay and Esther Island alternatives would result in moderate expansions of existing land and water uses. Neither alternative would affect area land ownership though existing permits would need modification.

Potential socio-economic impacts would be created by both of the proposed alternatives. Increases in hatchery and construction sector employment, project expenditures and public financing would all affect local economies.

After expansion, Main Bay would produce an additional three million sockeye salmon for the commercial fishery and for PWSAC cost recovery. The annual gross benefit to fishermen after increased production is projected at $26.3 million per year (based on a 1991 average sockeye salmon weight of 6.1 pounds and a 10 year average price per pound of $1.45).

In the Esther Island alternative, existing pink salmon production of approximately 1.3 million adults would not continue and instead would be replaced with approximately one million sockeye salmon. The projected gross annual benefit to fishermen from sockeye salmon production would be $7.5 million per year coupled with a approximate one half million dollar reduction in pink salmon revenues.

There would be both potentially positive and adverse impacts from either alternative on recreation. Potentially positive impacts would be mainly derived from enhanced sportfishing opportunities. There may be some spatial displacement of recreational users and degradation of wilderness and visual characteristics of the area by commercial fishing.

There would be both potentially positive and adverse impacts from either alternative on subsistence activities in Prince William Sound. Potentially positive impacts would be increased number of sockeye salmon available to harvest. Sockeye salmon are greatly preferred over pink salmon by subsistence resource users. Adverse impacts to subsistence activities may occur from increased commercial fishing activities competing with subsistence harvesters for both fish and non-fish resources, but the findings of the ANILCA Section 810 analysis are that there would not be a significant possibility of a significant restriction of subsistence uses.

1.0 PURPOSE AND NEED

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1.1 INTRODUCTION

The project area is associated with the Main Bay Hatchery located in the Chugach National Forest within the Nellie Juan-College Fiord Wilderness Study Area (Map 1). It is within a Wilderness Study Area (WSA) managed to maintain existing wilderness character consistent with the Wilderness Act of 1964 and provisions of ANILCA. As stated in the Chugach Land and Resource Management Plan (CLMP) "A sustained yield of products and services from the Chugach National Forest requires achieving and maintaining in perpetuity a high level annual or regular periodic output of the various renewable resources without impairment of the productivity of the land" (CLMP, Forest Service 1984, p. I-3). Further, Section 1315 (b) of ANILCA states that the "Secretary of Agriculture may permit fishery research, management, enhancement, and rehabilitation activities within national forest wilderness and national forest wilderness study areas..." The WSA is to be managed to maintain the existing wilderness character consistent with the Wilderness Act and the exceptions provided in ANILCA.

1.2 PROPOSED ACTION

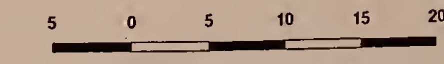
The Chugach National Forest is proposing to modify an existing special use permit issued to the Alaska Department of Fish and Game (ADF&G) to respond to a Prince William Sound Aquaculture Corporation (PWSAC) proposal for expansion of the existing sockeye salmon hatchery facility at Main Bay, Alaska (Figure 1-1). The hatchery is located within the Nellie Juan-College Fiord Wilderness Study Area which was established in the Chugach National Forest by Section 704 of the Alaska National Interest Lands Conservation Act (ANILCA) of 1980. The existing hatchery is currently operating under a Forest Service special use permit which allows "fishery research, management, enhancement, and rehabilitation activities within national forest wilderness and wilderness study areas" (Section 704 of ANILCA).

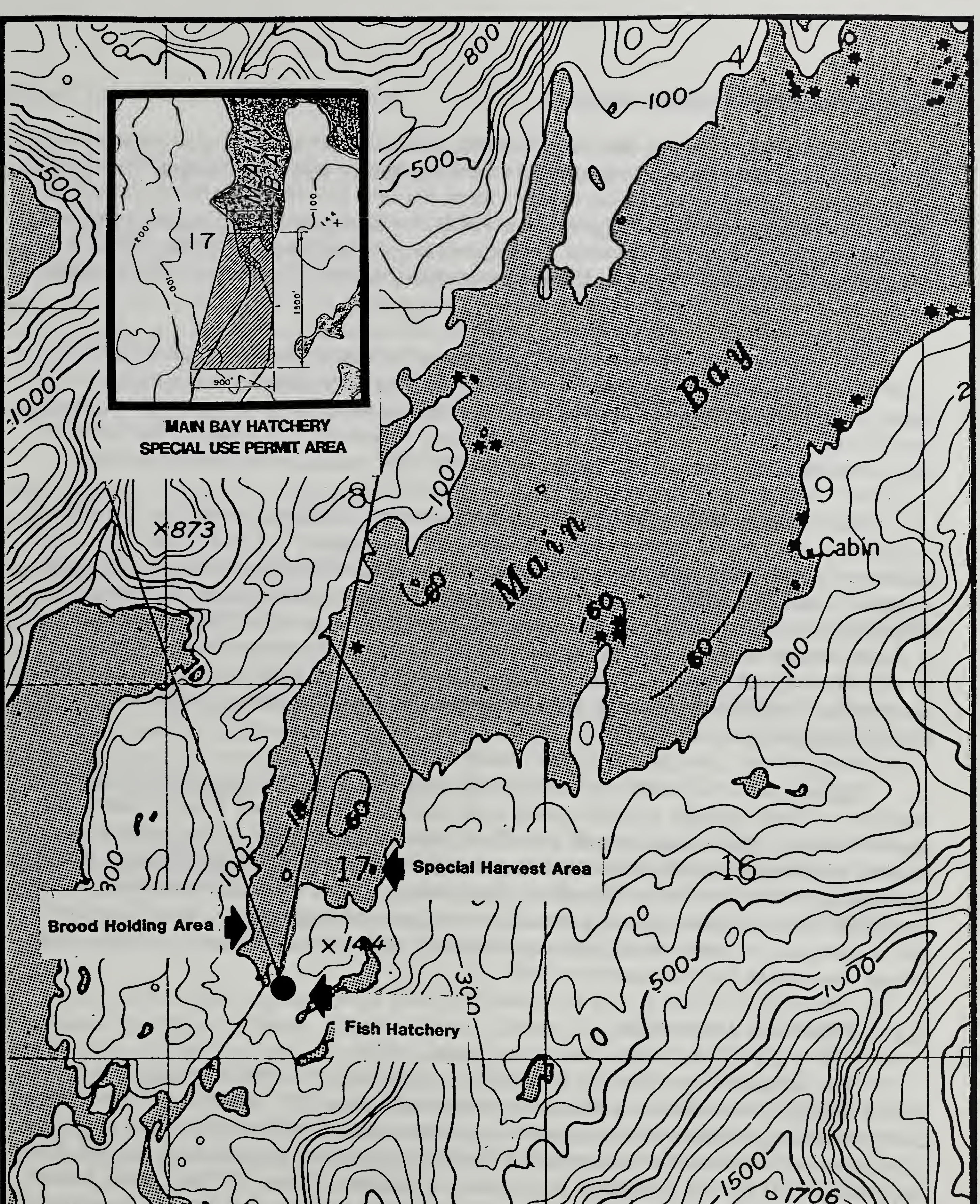
PWSAC assumed management of this hatchery in 1991 from the Alaska Department of Fish and Game. The hatchery managers recognized that the Main Bay Hatchery could provide the opportunity to expand benefits to the common-property fishery and to provide a more equitable distribution of resources among the various user groups by consolidating production of sockeye salmon at the Main Bay Hatchery and isolating production of chum salmon at the Esther Island Hatchery. The Alaska Department of Fish and Game, Fisheries Development and Rehabilitation Division (FRED) suggested at that time that a reasonable goal for the hatchery was to develop capabilities to produce 20 million sockeye salmon smolts. The proposal was to convert the hatchery to an experimental sockeye production facility. At the time there were no large scale sockeye facilities. The Main Bay Hatchery has since proved that large numbers of sockeye can be successfully produced. The proposal called for an eventual production of 4 million sockeye adults. In addition to just producing sockeyes, the hatchery production would help resolve allocation issues. This is important because Main Bay sockeye salmon are caught in gillnet fisheries, unlike most enhanced hatchery production from Prince William

Main Bay EIS

Map 1

MAIN BAY VICINITY MAP





LOCATION OF THE MAIN BAY HATCHERY

FIGURE 1-1

Sound. These gillnet fisheries have benefited less than other commercial gear groups from previous hatchery developments as identified in the Comprehensive Salmon Planning Phase I and II Documents. Sockeye to the gillnet fisheries meets the need for enhancing fish production at optimum sustained yield levels suggested by ANILCA, 1315a, and the Chugach Land and Resource Management Plan direction of improving fish habitat within the Nellie Juan Management Area. The Main Bay Hatchery presently produces 5.1 million sockeye salmon smolts.

The proposed hatchery expansion would allow an incremental increase in production from 5.1 to 20 million sockeye salmon smolts. This would bring production from one million up to approximately four million adult sockeye salmon and produce an estimated total common-property fishery revenue of $30 million, and a hatchery revenue of $15 million. The fishermen and processors would in turn pay approximately $560,000 in taxes to the State of Alaska.

The expansion plan calls for the addition of a hatchery building, a power house, a duplex residence, a bunk house, and a small warehouse (refer to Figure 2-1 in Section 2.0). The additions would be constructed on existing and new gravel fill within the confines of the current special use area of approximately 35.2 acres. The hatchery would incubate eggs from three different stocks and rear 70 percent of them in constructed runways at the facility and 30 percent at remote release locations. Salmon eggs would be taken from returning adults to the hatchery as well as wild sockeye salmon stocks from Eyak, Coghill, and Eshamy lake systems. This development would require permits for construction and operation from agencies of both the Federal and State governments.

Eggtake and smolt release activities would occur both at the hatchery site and at off-site locations. Off-site eggtake activities would occur at Eyak, Coghill, and Eshamy lakes. This operation would entail fixed-winged aircraft or vessel transportation to the eggtake areas. Remote smolt release operations would occur in the Coghill (until 1996) and Eshamy systems and sites approved from among Kings Bay, Port Chalmers, Barry Arm, or Nelson Bay. These operations would require fixed-wing aircraft or vessel transportation to the site and installation and maintenance of smolt net pens for approximately two weeks. The crew at these remote release sites would stay on board the vessel.

1.3 PURPOSE AND NEED

The purpose of the Main Bay fish hatchery expansion is to provide salmon resources to Prince William Sound fish user groups in accordance with the goal of restoring and maintaining fish production in the State of Alaska toward optimum sustained yield levels (ANILCA 1315a). The optimum yield of salmon resources is defined in the pertinent Forest Service Manual (R10 Supp-2300-92-1) as that designated in the State of Alaska's Prince William Sound Salmon Management Plan (PWSCSP). That plan seeks to establish an agreement between commercial seine and gillnet fishermen regarding the equitable distribution of hatchery-produced salmon among various user groups. As such, the major goals of the expansion are to increase sustained production of sockeye salmon and to increase revenue to the gillnet fisheries in Prince William

Sound. The Main Bay Hatchery is key in this plan because equity cannot be obtained for the gillnet fisheries under the required allocation policy until the expansion is complete.

The specific purpose of the proposed expansion is to implement and partially address the goals of the CLMP. The Forest Goals, as outlined in the CLMP, include goals to "Provide for the production of various Forest goods and services while minimizing adverse social, economic, and environmental effects.", and "Where possible, contribute to the local economy and provide for community stability" (Forest Service 1984, p. III-3). Among the Desired Future Conditions "The sport fishing and commercial fishery resources will meet or exceed the projected demand level. With aquaculture association activities, as well as ongoing Forest Service habitat improvement, demands for an expanding industry will be met" (Forest Service 1984).

Main Bay Hatchery is a currently operating sockeye salmon hatchery. The initial location of the hatchery was determined from ADF&G aerial and ground surveys as well as water quality tests. The selection of the site was based on availability of a freshwater supply from Main Lake, the excellent water quality, the potential for hydro-electric power generation, ease of management of hatchery stocks, the location of a terminal harvest area at the hatchery site, and the favorable location for common-property commercial fishery (Forest Service 1980a). These factors are also needs for the proposed hatchery expansion. The development of the original hatchery at Main Bay was addressed in an EIS (Forest Service 1980a). This document based the decision on the 1974 Forest Land Use Plan, the goals of ADF&G, conformance with the Federal Land Policy and Management Act of 1976, conformance with Executive Orders concerning wetlands and floodplains, conformance with the Wilderness Act and Forest Service policy, the benefit of economic stability in the Prince William Sound area, and the potential benefit to declining salmon stocks in that area.

Sites for fisheries enhancement, including hatcheries, lake stocking, stream stocking, and fishpasses were addressed in the Prince William Sound-Copper River Comprehensive Salmon Plan (ADF&G 1986). The sites outlined in the Comprehensive Salmon Plan provided the basis for the fisheries enhancement sites on Chugach Forest lands that were outlined in the CLMP. Further analysis would be required prior to any action involving these sites.

The initial Alaska Department of Fish and Game goal for a hatchery at Main Bay was to enhance the Eshamy District gillnet fishery in Prince William Sound. The Main Bay Hatchery was initially operated as a chum salmon production facility. By 1985, methods to reduce the incidence of IHN viral infection, an infection usually associated with sockeye hatcheries, were developed. This made possible the 1987 ADF&G conversion of the hatchery to a sockeye salmon production facility in order to meet user demand for higher quality salmon and to continue the development of hatchery culture technology for sockeye salmon.

In early 1990, PWSAC voted to work to take over management and production of Main Bay Hatchery by July 1, 1991. Part of the long-range goal for this hatchery was to expand the production of adult sockeye salmon to benefit both the commercial common-property fishery and PWSAC by diversifying their revenue base through a cost recovery fishery at Main Bay.

1.4 DECISION TO BE MADE

The decision to be made is whether or not to expand the upland facilities of the Main Bay Salmon Hatchery to be capable of producing up to 20 million sockeye salmon smolts. The decision will be made by the Regional Forester for the Alaska Region of the USDA Forest Service.

1.5 RELATIONSHIP TO OTHER PLANNING LEVELS

The proposed action would be conducted on the Chugach National Forest lands managed under the Chugach Land and Resource Management Plan as amended, Chugach National Forest (Forest Service 1984). The integrated land and resource plan provides for management direction for all forest resources. The intent of the CLMP is to manage the land and resources under the multiple use concept wherein the various renewable resources would be "utilized in the combination that will best meet the needs of the American people" (Forest Service 1984).

The objectives of the proposed action predate the Exxon Valdez oil spill and the planning efforts for restoring the resources affected by the spill. Therefore, there is no direct connection between the proposed action and the oil spill restoration planning efforts.

The proposed action is within the Nellie Juan Management Area as established in 1984 by the CLMP. The direction of the CLMP for the area includes management for wilderness and improvement of fish habitat as well as cooperation with other fishery resource management groups and agencies. The potential sites included in the development evaluation, along with several other sites were considered during development of alternatives discussed in this Draft EIS.

The proposed development takes into account the goals in the CLMP. As stated in the Plan "A sustained yield of products and services from the Chugach National Forest requires achieving and maintaining in perpetuity a high level of annual or regular periodic output of the various renewable resources without impairment of the productivity of the land" (Forest Service 1984). For the purpose of developing action alternatives it was assumed that "land" included land above the high tide mark, as well as any other habitat or medium that would directly or indirectly impact the character, management, or sustainability of the lands of the Chugach National Forest and/or the Nellie Juan-College Fiord Wilderness Study Area. Specific to the Nellie Juan area the CLMP encourages a management direction toward fish habitat improvement by cooperation "with other fishery resource management groups and agencies in hatchery development evaluation..." (Forest Service 1984).

The proposed action falls with the authority of the Memorandum of Understanding between the ADF&G, Forest Service, and PWSAC. The two most pertinent sections deal with aquaculture developments. Here ADF&G, Forest Service, and PWSAC mutually agree to cooperate in the development and application of plans and projects for the enhancement, rehabilitation, and maintenance of salmon and their habitat in a manner which mutually supports the goals and objectives of the three organizations. The three parties also agree to recognize the

purposes for which wilderness areas were established, to design facilities within the Wilderness so as to minimize the impact on Wilderness values and to plan aquaculture projects so that those involving structures or potential effects on wild salmon stocks are implemented outside of Wilderness areas to the extent that suitable opportunities are available (Forest Service 1981, Section D, items 2 & 3).

1.6 PERMITS AND APPROVALS FOR THE PROPOSED ACTION

Most permits applicable to both the Main Bay and the Esther Island hatchery alternatives were obtained prior to construction of each hatchery. PWSAC and ADF&G consulted with State and Federal agencies to determine which permits would be required and which would need to be modified to accommodate the projects. A complete listing of required permits is presented in Appendix 1-1.

1.7 PUBLIC INVOLVEMENT

The public involvement began on November 15, 1991 when a Notice of Intent to prepare an Environmental Impact Statement was filed with the National Archives and Records Administration for publication in the Federal Register. Shortly after that, a public notice of intent to prepare an Environmental Impact Statement was published in five Alaskan newspapers on the following dates: Anchorage Times, December 11, 1991; Anchorage Daily News, December 11, 1991; Cordova Times, December 18, 1991; Seward Phoenix LOG, December 19, 1991; and Valdez Vanguard, December 19, 1991. The notification described the proposed hatchery expansion, discussed the anticipated additional return of adult sockeye salmon to the common property fishery, and invited public comment in order to direct the scope of the EIS.

In December 1991, letters were mailed to approximately 500 members of the public and to various Federal and State agencies. The letter discussed the Forest Service's intent to prepare an EIS for the expansion of the Main Bay Hatchery. It summarized the proposed action by giving a brief history of the hatchery at Main Bay and discussed the rationale for the expansion. The letter briefly discussed the details of the expansion including construction, additional hatchery space, water supply systems, and expanded staff housing accommodations.

The letter also included a list of potential issues to be addressed during the Draft EIS process. The letter requested comments for determining additional public scoping issues relating to the proposed action. Comments were also requested by mail from State, Federal, and local agencies. The list of municipal, State, and Federal agencies; organizations and businesses; and individuals receiving the scoping letters is provided in Appendix 1-2.

During the preparation of this Draft EIS, an announcement letter was mailed to those on the project mailing list, on September 8, 1992. The letter stated that the Glacier Ranger District of the Chugach National Forest was seeking additional public comment on the proposed expansion of the Main Bay Hatchery. The letter also notified the recipients that the Draft EIS would be released soon and that a public meeting to be held in Anchorage, Alaska would be scheduled subsequent to the release. The letter listed the scoping issues addressed in the

environmental analyses and summarized the alternatives considered, including a No Action alternative.

The letter included a pre-addressed postcard that would allow the letter's recipients to request a copy of the Draft EIS and to express their interest in attending a public meeting. The postcards were to be returned to the Glacier Ranger Station.

1.8 ISSUES

Responses to the Forest Service scoping letter were received at the Forest Service Glacier Ranger District Office. As each letter was received, the stated issues were categorized by topic (e.g., wilderness issues, commercial fishing issues). This allowed the scoping issues to be viewed and discussed in an organized summary fashion. The scoping issues summarized below are from those listed in the public announcement letter submitted by the Forest Service and from comments received from the public and agencies in response to the public announcement. This summary outlines and discusses the major issue areas. Each issue is addressed in this Draft EIS. Copies of the Forest Service public scoping letter, the Forest Service Draft EIS announcement letter and the public scoping letters are included in the Planning Record at the Glacier Ranger District.

The issues include:

1. What effect would the proposed development have on the wilderness character of the Nellie Juan-College Fiord Wilderness Study Area as designated in ANILCA?

The concern is that activities associated with the production or harvest of fish would adversely affect wilderness characteristics such as solitude, primitive recreation experiences, physical and mental challenge and stimulation, and inspiration.

2. What effect would the introduction of additional hatchery stocks of sockeye salmon have on existing wild stocks?

The concern is that additional hatchery-produced sockeye salmon may have a negative impact on wild stocks of all salmon species by increasing competition for food, by increasing the potential for viral infection, by over harvesting wild stocks, and by interbreeding associated with straying.

3. What effects would increased hatchery production at the Main Bay or the Esther Island hatchery have on the hydrology of their respective water sources and the water quality of the receiving waters.

The Main Bay Hatchery is dependent on the ability of Main Lake to provide a continuing source of water for both hatchery operations and power generation. Esther Island Hatchery uses water primarily for hatchery operations. A concern is that hatchery operations would reduce or draw down the water level in the respective water source lakes. Under these conditions, a

source lake outlet stream could have reduced flows and reduced fish habitat. Another concern is the effect of effluent from these hatchery operations that would be discharged into the adjacent bays.

4. What effects would increased production of sockeye salmon have on the commercial fishing industry in Prince William Sound and on marketing and processing of the fish?

The concern is that resource allocation may change for the seiners, drift gillnetters, and set gillnetters; the main competing user groups. Depending on fishing times, migratory patterns, and management practices; these three groups may be affected differently by increased sockeye production.

5. What effects would the expanded hatchery have on recreational opportunities in western Prince William Sound?

The concern is that the proposed action might negatively affect one or more of the several types of recreation opportunities that exist in western Prince William Sound, such as fishing, hunting, recreational boating, camping, hiking, and guided tours. Additional air and water transportation activity and changing patterns of commercial fishing that would result are key factors of concern.

6. What effects would expanded production of sockeye salmon have on subsistence activities?

The concern is whether increased commercial fishing effort in areas used by subsistence harvesters may significantly restrict existing subsistence harvesting of fish or other resources because of competition from nonsubsistence users, restriction of access, or reduction in the populations of subsistence resource species.

1.9 ISSUES NOT CONSIDERED

The issue concerned with enhanced sockeye salmon having an impact on ocean foodchains was not addressed in this Draft EIS. This issue is global in extent and as such exceeds the boundary of the Chugach National Forest. Consequently it is beyond the scope of the decision to be made.

1.10 CONTENTS OF THE DRAFT EIS

This Draft EIS contains a Summary; chapters entitled Purpose and Need, Alternatives, Affected Environment, Environmental Consequences, List of Preparers of the Draft EIS, Glossary, Literature Cited, and Index; and Appendices.

The Purpose and Need chapter gives the purpose, history, and objectives for the proposed action. The chapter on Alternatives presents a description of the action alternatives including the proposed alternative and the No Action alternative. The chapter on the Affected Environment describes the existing environments in the areas potentially affected by any of the alternatives. The Environmental Consequences chapter discusses the environmental impacts of all action and No Action alternatives considered.

The List of Preparers chapter includes all persons, agencies, or organizations directly involved in the preparation of the Draft EIS. The Glossary provides a list of commonly used terms and acronyms that occur in the Draft EIS. The Literature Cited chapter gives citations for all literature referenced in the previous chapters. The Index chapter gives chapter and page numbers of key words and phrases used in the previous chapters. The Appendix provides documents and details of materials prepared in connection with the Draft EIS.

All Planning Record material associated with the Draft EIS is available to the public at the USDA Forest Service, Glacier Ranger District, P.O. Box 129, Girdwood, Alaska 99587.

2.0 ALTERNATIVES

2.0 ALTERNATIVES

2.1 INTRODUCTION

This chapter describes alternatives that wholly or partially meet the purpose and need identified in Chapter 1, summarizes the effects of the alternatives, and describes mitigation and monitoring for the alternatives. It also includes a No-Action alternative as required under the National Environmental Policy Act (NEPA) and addresses alternatives considered, but eliminated from further study.

The interdisciplinary team (IDT) considered various means of addressing the purpose and need for the proposed action. In the context of available technology, the only way to produce enough fish to fulfill the purpose and need is to expand or construct hatcheries. In order to fulfill the purpose and need and address significant issues, a range of potential hatchery sites were considered in the analysis by the IDT. In addition to the proposed action at Main Bay, the IDT considered potential expansion of other hatcheries and potential sites for new construction. Previously identified sites listed in the Prince William Sound-Copper River Comprehensive Salmon Plan (ADF&G 1986) and the CLMP formed the basis for the initial list of potential alternatives. A total of 12 alternatives and one No Action alternative were considered. The 12 alternative sites were Main Bay, Esther Island, Cannery Creek, Sawmill Bay, Cascade Falls, McClure Bay, Pirate Cove, Shrode River, Mink Creek, Foul Bay, Princeton Creek, and Marsha Bay (Map 2). The No Action alternative means that no new hatchery development would occur.

All of the alternative sites were considered with respect to the following technical criteria: proximity to the fishery, sufficient water supply of good quality, sufficient spatial area, economic feasibility, and cost recovery (capture and sales of returning adult salmon conducted by a hatchery operator to recover the costs associated with operations). The alternatives were also evaluated on their ability to respond to the scoping issues identified in Chapter 1.

2.2 ALTERNATIVES ELIMINATED FROM DETAILED STUDY

A total of 10 alternative sites were eliminated from detailed study. In addition, an alternative considering a Main Bay Hatchery expansion without additional remote release sites was eliminated. Improvement, remodeling, or expansion of other Prince William Sound Aquaculture hatcheries as well as development of new hatchery sites were considered. The following alternatives were not selected for detailed study since they failed to meet several minimal qualifications including potential impact to wild stocks, water supply capabilities, water quality needs, spatial considerations, economic feasibility, or cost-recovery capabilities. They are discussed briefly below.

Main Bay EIS

Map 2

ALTERNATIVE SITES CONSIDERED

LEGEND

Existing Hatcheries

1 Main Bay

2 Wally Noerenberg Esther Island

3 Cannery Creek

4 A. F. Koernig

5 Solomon Gulch

✱ Town or Village

• Sites Considered for Sockeye Salmon Enhancement

5 0 5 10 15 20

APPROXIMATE SCALE IN MILES

The **Cannery Creek Hatchery**, located in Unakwik Inlet, produces only pink salmon. This hatchery is currently at or near maximum water usage; consequently, expansion or conversion to sockeye salmon production would require significantly increased water usage and likely exceed existing water supply. The lake feeding Cannery Creek is shallow, thus temperatures are colder than normal in the winter and warmer in the summer. Summer temperature ranges of 15-19° C are generally considered too warm for the proposed sockeye salmon stocks for both maturing adults and juvenile rearing. The length of the creek downstream of the hatchery is such that brood maturing for sockeye salmon may not be possible.

The **Armin F. Koernig Hatchery (AFK)** is located in Sawmill Bay on Evans Island near the village of Chenega. This hatchery currently produces only pink salmon. At this site, water supply is limited and the hatchery is currently conserving water through recycling. Additional sockeye salmon production would require significant additional water exceeding available supply. Because this is an intercept fishing area where many mixed stocks enter Prince William Sound, it is not viewed as a feasible release site and the sockeye salmon would need to be transported to other areas for release to protect wild stocks.

New site construction was also considered. This alternative would require sufficient spatial area as well as an adequate water supply. Within Prince William Sound, PWSAC has obtained a State of Alaska Salmon Hatchery Permit for **Cascade Falls** in Eaglek Bay. This site, located on Forest Service-managed land, is currently undeveloped. Since the permit was issued, other information has emerged to indicate that development at this site would not be feasible. The water temperature is too cold to support sockeye salmon incubation and rearing because the water source is a glacially-fed lake.

Additional sites included in the Prince William Sound-Copper River Regional Comprehensive Salmon Plan (ADF&G 1983) and the CLMP were considered. These sites include **McClure Bay**, **Pirate Cove**, **Shrode River**, and **Mink Creek** located in the Northwestern and Coghill Districts; **Foul Bay** located in the Eshamy District; and **Princeton Creek** and **Marsha Bay** in the Southwestern District. (Chapter 3.10.1 describes these management districts by gear type and location.)

Since the original Salmon Plan, a further refinement of the plan has been conducted (ADF&G 1986). Subsequent to the initial consideration of these sites, salmon management analysis and wild stock investigations have caused regional planners and hatchery operators to narrow their focus on sites for hatchery enhancement. Potential sites for hatcheries were first identified principally for their fresh water sources. With greater experience in salmon enhancement, wild stocks and mixed stock management, new criteria have been established to revise hatchery site selection and release areas. There are two major concerns with wild stocks: overfishing wild stocks in the process of harvesting returning hatchery stocks, and the mixing of hatchery fish into a wild stock spawning area (genetic introgression). Both of these problems exist when a hatchery or remote release site is too close to the naturally occurring sockeye salmon spawning stream. The release of hatchery produced sockeye in close proximity to wild sockeye stocks is prohibited by ADF&G policy (ADF&G 1985).

For each site listed above, possible mixed stock management problems, proximity to existing hatcheries, and concerns for managing hatchery returns reduced the potential for the sites at McClure Bay, Pirate Cove, Shrode River, Mink Creek, and Foul Bay to support salmon hatcheries. For example, with weak returns of wild pink and chum salmon to the Northwest District, salmon management must be conservative to achieve spawning escapement. Similarly, the Coghill District is managed for the Coghill Lake sockeye salmon return. With both the Esther Island Hatchery and Main Bay Hatchery systems in place near these locations, additional hatchery sites in these districts would make the management of wild and hatchery stocks of sockeye salmon complicated since there would be cumulative problems with genetic introgression and additional interception of wild stocks.

Likewise, Princeton Creek and Marsha Bay present salmon management problems in the Southwestern District. The additional production of hatchery salmon in this district would worsen mixed stock management. Princeton Creek would not receive support for sockeye salmon production due to the adjacent wild stock at Jackpot Lake. Genetic introgression concerns would override any interest to construct a sockeye salmon facility at that location. Genetic introgression of wild and hatchery stocks would also provide argument for not permitting a hatchery at the Shrode River location since there is a wild stock in that system.

The alternative of a Main Bay Hatchery expansion without additional remote release sites was eliminated because the number of returning fish would exceed the ability to manage for the protection of wild stocks migrating through the area. Avoiding this problem by reducing the total number of fish produced would not meet the purpose and need for the project.

Three alternatives were considered for detailed study: the proposed Main Bay Hatchery expansion, an alternative to remodel the Esther Island Hatchery, and a No-Action alternative. The action alternatives were considered because of their suitability to achieving the goal of enhancing sockeye salmon adult returns for the gillnet fleet and thus creating a higher degree of equity among the various commercial fishing groups in western Prince William Sound. Specifically the action alternatives would enhance the sustainable yield of a renewable resource that would in turn benefit commercial fishing interests, sports fishing opportunities, and subsistence resource users. The proposed action would provide for low potential impact to wild stocks of salmon in Prince William Sound and would benefit specifically commercial fishing groups by expanding sockeye salmon production, providing a more equitable distribution of salmon resources among the various commercial fisheries in western Prince William Sound.

2.3 MAIN BAY ALTERNATIVE

2.3.1 Introduction

The Main Bay alternative would include expansion of the existing facility located at the head of Main Bay (Map 3) (Figure 2-1). Primary expansion activities would include:

1. The expansion of the existing hatchery rearing/incubation space;

Main Bay EIS

Map 3

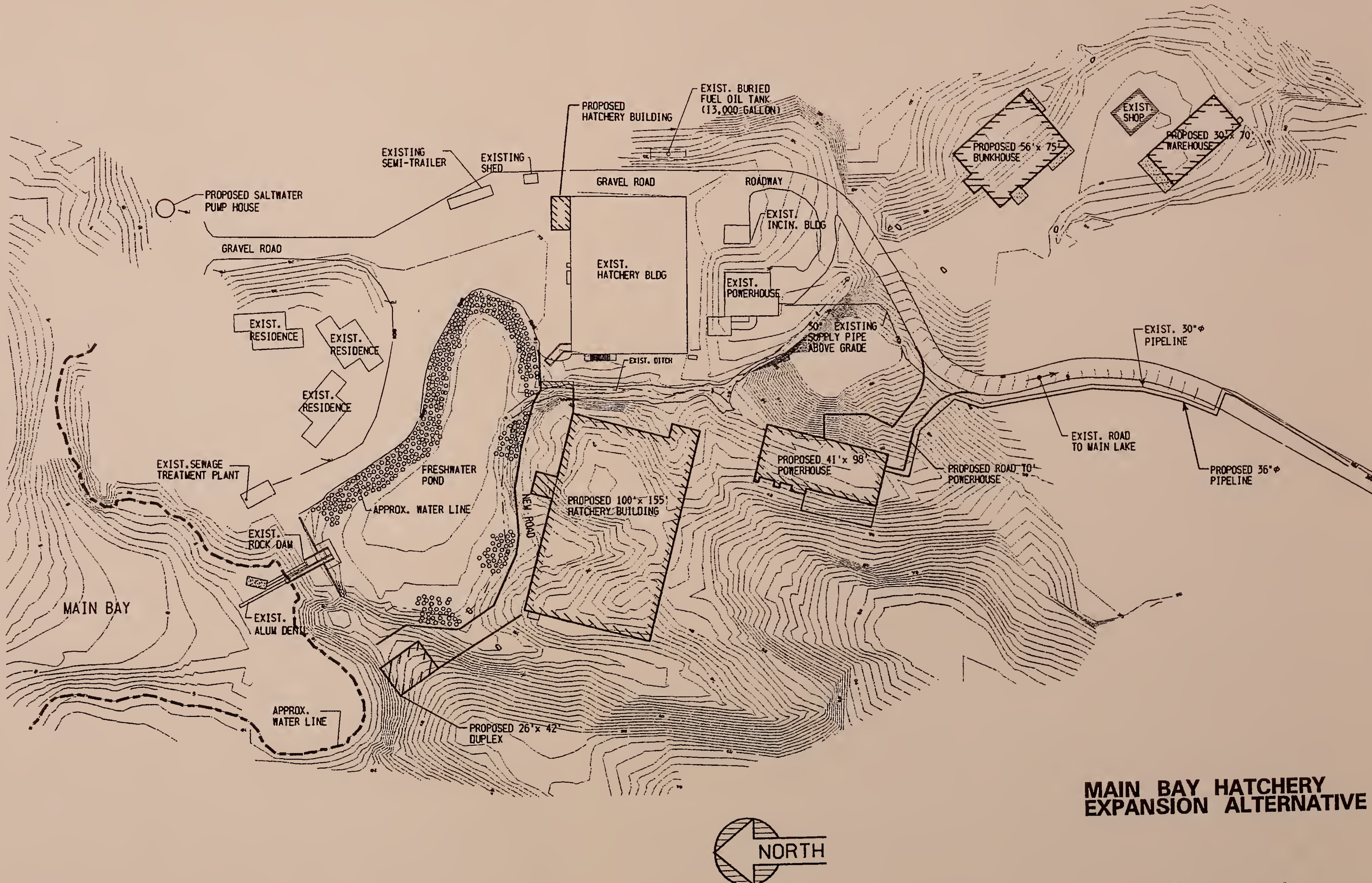
Main Bay Alternative

LEGEND

- 1 Main Bay Hatchery
- 2 Wally Noerenberg Esther Island Hatchery
- * Town or Village
- Egg Take Sites
- Remote Release Sites
- Esther Island State In Holding

5 0 5 10 15 20

APPROXIMATE SCALE IN MILES



MAIN BAY HATCHERY EXPANSION ALTERNATIVE

FIGURE 2–1

2. An increase in the salt water rearing space;

3. Improvements to the capacity and flexibility of the hatchery water supply system;

4. A new power generation facility;

5. Expansion of effluent treatment and discharge capabilities;

6. Annual remote sockeye salmon eggtakes in the Eyak, Coghill, and Eshamy systems;

7. Annual remote sockeye salmon smolt releases into the Coghill and Eshamy systems, and other potential remote release sites (described below).

2.3.2 Expansion of the Existing Facility

Facility improvements for the proposed expansion would be confined within the existing special use area of approximately 35.2 acres. Approximately 3 acres would be cleared of vegetation, and 12,500 cubic feet would be excavated for pad construction to accommodate expanded hatchery facilities (refer to Figure 2-1). Construction materials to be used in the expansion would be of the same color and texture as that of the existing facilities.

<u>Rearing and Incubation Space</u>

The hatchery rearing/incubation space would be increased in two ways. First, the incubation space in the existing hatchery building would be doubled by eliminating the current staff quarters on the incubation floor. This would allow 14 million eggs to be incubated and 10 million smolts to be reared in the existing hatchery building. Second, a new hatchery building would be constructed to the west of the existing hatchery building (refer to Figure 2-1). The new building would be a two story structure similar to the existing hatchery. The upper level would have sufficient space to incubate an additional 14 million eggs, as well as accommodate the office, laboratory and storage needs for both hatchery buildings. The lower level would have raceways for final freshwater rearing of at least 10 million smolts. These would then be released in salt water.

Salt water rearing space would be expanded by constructing a floating net pen complex in Main Bay to the north of the hatchery. The structure would be built to allow efficient feeding of the smolts and would have floating feed storage. The structure would consist of a 500 ft. long floating dock section of post-tensioned concrete that will provide stability for the net pen complex. At least 20 40'x40' netpen frames will be attached. This netpen complex will provide for approximately 9000 m^3 of saltwater rearing space. A floating breakwater may be included to protect the complex during inclement weather.

Water Supply Requirements

The capacity of the water supply would be approximately doubled to support the increased hatchery production. The existing hatchery water system has two intake lines, shallow and deep, in Main Lake with a single 30" pipeline to the hatchery. The specific improvements needed to provide the added capabilities are a second deep water intake line, a second parallel pipeline from the lake to the hatchery (constructed on the existing pad), a new larger capacity powerhouse and an enhanced water distribution (piping) system at the hatchery. Water use at the hatchery, and subsequent effluent discharge to marine waters, would be a maximum of about 40 cubic feet per second (25.9 million gallons per day), and a minimum of about 6 cfs. Stream outflow from Main Lake would cease for periods of days to months during the winter and spring. Water rights for this water would be attained from the State of Alaska by PWSAC.

Power Generation

A new power generation facility would be constructed to provide for the increased power needs of the facility and to accommodate the increased flexibility of the hatchery water supply system. Hydroelectric power would be the primary source of power; diesel generators would be occasionally used as emergency backup. To upgrade the hydroelectric power capabilities, additional pump turbines and associated controls would be installed in the new powerhouse. The existing turbine would be relocated in the new powerhouse. The existing powerhouse would be remodeled as required and emergency backup diesel generators would be installed.

The emergency diesel electric generation capacity would also be expanded to provide for the emergency power needs of the facility. The existing powerhouse would continue to be used to house the central heating and mechanical equipment as well as the diesel generation equipment.

Waste Water Effluent

It is estimated that hatchery incubation/rearing effluent wastewater would double in volume from an approximate daily average of 14.2 cubic feet per second [9.2 million gallons per day (gpd)] to 28.5 cubic feet per second (18.4 million gpd). Primary disinfection of hatchery equipment is with steam, however small quantities of chlorine and iodophor are also used and are part of the discharge. Hatchery incubation/rearing effluent wastewater would be discharged into saltwater away from rearing pens via the underwater outfall pipe.

Additional domestic wastewater from the expanded living quarters would be treated in a newly installed septic tank system. It is estimated that approximately 240 gallons per day would be treated in the new system. Adding to the existing discharge of approximately 2,150 gallons per day, the estimated total domestic discharge would be 2,390 gallons per day. The point of discharge for wastewater would be into Main Bay adjacent to the hatchery. Discharge of both hatchery effluent and domestic waste water would be done in accordance with Federal and State of Alaska regulations.

Housing and Infrastructure

Increases in the basic production capacity of the facility requires that the supporting services at the facility be improved to accommodate and house the increased staff, power and equipment needs.

Both permanent and temporary housing would be increased with the expanded facility. A new bunkhouse would be built to replace the temporary staff quarters lost to the incubation expansion in the present hatchery building and to provide additional space for the larger temporary staff. Three housing units, a duplex and an apartment in the new bunkhouse, would be provided for the additional permanent staff.

During the construction phase a variety of mechanized equipment would be used. These would include bulldozers, loaders, rock drills, air compressors, rock crushers, backhoe, earth compactor, dump and flat bed trucks, and truck-mounted cranes. Approximately 10,000 cubic yards of earth and rock would be excavated to prepare the foundation for the new hatchery building and to widen portions of the pipeline access road. Approximately 90 trees greater than 6 inches in diameter would be cleared. Additionally smaller equipment such as chain saws, wood saws, and pneumatic tools would be used.

Construction Sequence

Construction would consist of two phases extending over a two year construction period, and would be planned such that disruptions to the existing hatchery would be minimized. The existing hatchery would remain in operation throughout the construction period.

Phase I Construction: Sitework would begin with clearing, blasting, and grading of the site as required for the new hatchery building, new powerhouse, and new bunkhouse. Drainages and utilities required for the operation of these respective buildings would be completed within this initial phase.

The remodelling of the existing hatchery building and construction of a new powerhouse and bunkhouse buildings would be completed within the first year phase. All electrical, mechanical and utilities work associated with these new structures would also be completed during Phase 1. No work would be planned on the new waterline or upgrading the hydroelectric power generation capabilities during Phase 1.

Phase 2 Construction: Initial work would include regrading sites, as required, for the new hatchery building, duplex and warehouse. Blasting would occur, as required, for supply and drainage trenches, and new raceways. Construction of loading pads and site grading would occur next, followed by construction of the new hatchery, duplex, and warehouse buildings. All electrical, mechanical, and utilities work would be completed.

During Phase 2, expansion of the water supply and power generation capabilities would occur. A second deep water intake and pipeline, parallel to the existing line would be installed. Two new pump/turbine generation units would be added to the existing turbine generator.

2.3.3 Expansion of Existing Production

The expansion of sockeye salmon production at the Main Bay Hatchery would require expanding remote eggtake and remote release activities.

Remote Eggtake Activities

The purpose of remote site eggtakes is to develop a brood stock at the hatchery. Currently, the Main Bay Hatchery is permitted to collect approximately 4.5 million sockeye salmon eggs annually from the Eyak, Coghill, and Eshamy systems (Map 3); the latter two are in the WSA. After approximately 3-4 years eggtakes would no longer be necessary from within the Eyak system as sufficient brood stock would be returning to Main Bay. Approximately 10.5 million eggs, 5 million beyond currently permitted eggtake quantities, would be needed to meet production goals (The exact number of eggs and locations of eggtakes would depend on results from stream system evaluation studies). PWSAC would use eggtake procedures developed by ADF&G for IHNV reduction in sockeye salmon. These procedures are on record at the hatchery and are available from ADF&G. Eggtake activities consist of transport by fixed-wing aircraft to approved collection stream systems, and capturing by net mature (ripe) females for extraction of eggs. The procedure would involve 6-7 hatchery employees and would be completed within current eggtake activity periods of 1-3 weeks. Temporary shoreline campsites and/or an anchored vessel are not necessary for eggtake operations as the eggs need to be immediately transferred by aircraft to the hatchery. A total of 8-12 fixed-wing aircraft round-trip flights would be necessary at each remote eggtake location.

Remote Smolt Release Activities

Sockeye salmon smolt targeted for remote release would be transferred direct from hatchery freshwater raceways to the salt water release location via freshwater transfer tanks and barge. All smolts would be reared in 40'x40'x10' saltwater holding pens as close as possible to the fresh water source for a minimum of two weeks and maximum of three weeks. Netpens would be anchored using four 150-200 lb. removable steel anchors. Approximately 2-3 hatchery employees would remain at each holding pen release site for a period of 2-3 weeks. Approximately 2-3 fixed-wing round-trip flights would be necessary to support remote release activities.

Several remote release sites are associated with providing commercial fishing opportunities in other areas than Main Bay itself (Map 3). Current planned remote releases from Main Bay Hatchery include 720,000 sockeye smolts at the mouth of Coghill River and 1,040,000 sockeye fry into Eshamy Lake. From 1993 to 1996, Coghill stock remote release sites will include Barry Arm in Port Wells, Coghill Lake, and Main Bay, given ADF&G and Forest Service (if applicable) approval. Remote release involving Eshamy sockeye stock are planned

for Eshamy Lake and Main Bay (PWSAC 1991). Beyond this period, remote releases will be determined by the results of the ADF&G evaluation projects (see monitoring section).

Fisheries Enhancement Goal

The expanded hatchery would produce approximately 20 million smolts from three stocks with different run-timing: Eyak, Coghill, and Eshamy. These would be available to the fishery from mid-May to the end of August. At the existing level of production (about five million smolt), a return of approximately one million adult sockeye salmon (722,320 Coghill stock, 288,928 Eshamy stock, and 7,050 Eyak stock) can be expected by 1996.

With completion of construction after 1996, the expanded hatchery would produce 20 million smolts after 1998 (10 million Coghill, five million Eshamy and five million Eyak smolts). This production would result in a return of four million adult sockeye salmon by the year 2001 (two million Coghill, one million Eshamy, and one million Eyak adults. The mix of fish stocks may differ depending on evaluations conducted by ADF&G. Exact timing of completion of the project is dependent on the results of interim evaluation work on releases of juvenile, and returning adults to Main Bay and other release sites.

Smolts would be held in saltwater pens for several week (a process called imprinting) and released at Coghill, Eshamy, and possibly other release locations to provide added fishing opportunities and to assure that sufficient numbers of adults enter the spawning streams (escapement) would be maintained. Approximately 38% of the smolt production would be scheduled for release at the remote release sites. About half of the Coghill stock sockeye salmon produced at the Main Bay Hatchery would return to the Coghill District and/or selected remote release sites, and half of the Eshamy stock sockeye salmon would return to Eshamy Lagoon and/or selected remote release sites. The hatchery would utilize about 30% of the returns for brood stock (mature adult fish captured, usually at the hatchery site, and used as spawning stock for the hatchery) and cost recovery.

Years to Achieve Hatchery Capacity

The expanded hatchery would have a capacity of 28.3 million green (newly fertilized) sockeye salmon eggs composed of the following stocks: 14.1 million Coghill, 7.1 million Eshamy, 7.1 million Eyak. This corresponds to 10 million Coghill, 5 million Eshamy, and 5 million Eyak smolts.

Hatchery expansion is planned in two phases. Assuming availability of funds and approval of required State and Federal permits and management plans, Phase 1 would be completed in August of 1994 and Phase 2 would be completed after 1996. Schedules for production increases related to Phase 2 construction may vary based on evaluations, fisheries management data, and potential adverse impacts due to interactions with wild stock. This would be reviewed annually by ADF&G.

It is unlikely that enough surplus brood stock would be available from donor streams to meet the expanded hatchery capacity. Full production would therefore not be reached until returns to the hatchery provide sufficient brood stock. This could occur after 1996 when brood stock equilibrium for all three stocks at the expanded level would be reached. Should the expansion be completed before 1995, PWSAC may elect to use a combination of Coghill and Eshamy stocks until sufficient returns of Eyak stock are available.

On-station Production

Five million Coghill, 2.5 million Eshamy and five million Eyak stock would be released at the hatchery (on-station). This should provide a return to the hatchery of 2.5 million adults. Numbers and stocks of on-station releases may vary based on annual review of data with regulatory agencies to accommodate management and biological concerns related to wild stocks.

Off-station Production

The goal is to release five million Coghill stock sockeye salmon smolts in designated off-station sites including Coghill District locations and Coghill supplementation, and 2.5 million Eshamy stock sockeye salmon smolts in designated off-station sites including Eshamy supplementation. This would serve two purposes: 1) provide for expanded fishing opportunities over a larger geographic area; and 2) assure that spawning escapement to the lakes is maintained. Supplementation would thus allow an increase in sockeye salmon adult returning to the lakes, so that hatchery brood stock requirements are met and that there would be adequate escapement of wild stock salmon to Coghill and Eshamy lakes. Other stocking site options, including Kings Bay (Port Nellie Juan), Port Chalmers (Montague Island), Barry Arm (Port Wells), and Nelson Bay (Eastern District) (Map 3), are being reviewed as part of the Phase III Prince William Sound-Copper River Comprehensive Salmon Planning process. The Main Bay expansion would include cooperative work with State and Federal agencies for potential F_1 supplementation (stocking of fry that were spawned from wild stock and reared in a hatchery) for the Eshamy and Coghill systems.

2.4 THE ESTHER ISLAND ALTERNATIVE

2.4.1 Introduction

The conversion of the Esther Island Hatchery is an alternative to the Main Bay Hatchery development. Within western Prince William Sound, the Wally Noerenberg Esther Island Hatchery (WNH) is the only other available hatchery site with sufficient water supply, acceptable water temperature, and feasible construction possibilities to accommodate expansion. This hatchery is located in Lake Bay on the southern shore of Esther Island (refer to Map 3 and Figure 2-2).

LOCATION OF THE WALLY NOERENBERG ESTHER ISLAND HATCHERY

Figure 2-2

This hatchery has a separate facility (referred to as the Wally Noerenberg Hatchery II or WNH II) (Figure 2-3) that could be converted to accommodate sockeye salmon instead of pink salmon. This conversion could accommodate only sockeye salmon raised to the fry stage due to water and space limitations, and concerns of disease associated with long-term rearing to the smolt stage.

Primary expansion activities would include:

1. The remodelling of the existing pink salmon hatchery incubation space;

2. Improvements to the capacity and flexibility of the hatchery water supply system;

3. A new power generation facility;

4. Expansion of effluent treatment and discharge capabilities;

5. Annual remote sockeye salmon eggtakes in the Coghill and Eshamy systems;

6. Annual remote sockeye salmon fry releases into the Coghill and Eshamy lake systems, and other potential remote release sites (described below).

The existing facility, not part of the WSA, is located within the boundaries of Chugach National Forest on State-administered land within the State-established Esther Island Marine Park (refer to Map 3). According to 40 CFR Chapter V, Part 1502.14 (c), all reasonable alternatives not within the jurisdiction of the lead agency should be included in the DEIS. The lands on which the hatchery sits and adjacent tidelands are administered by the State of Alaska Department of Natural Resources (DNR) as part of the land entitlement under the Statehood Act. Re-construction would take place outside of the WSA, while eggtakes and remote release of fry would be conducted within the WSA administered by the Forest Service. Eggs would be collected in the Coghill and Eshamy systems, and fry would be released at those systems as well as several candidate lakes.

2.4.2 Expansion of Existing Facility

The Esther Island alternative would include demolition of some existing facilities and re-construction on existing pads. The area to be demolished and regraded would be approximately 2 acres and would include the excavation of about 4,000 cubic feet of soil and rock material. Construction materials to be used in the expansion would be of the same color and texture as that of the existing facilities. During the construction phase a variety of mechanized equipment would be used. These would include bulldozers, loaders, rock drills, air compressors, rock crushers, backhoe, earth compactor, dump and flat bed trucks, and truck-mounted cranes. Additionally smaller equipment such as chain saws, wood saws, and pneumatic tools would be used.

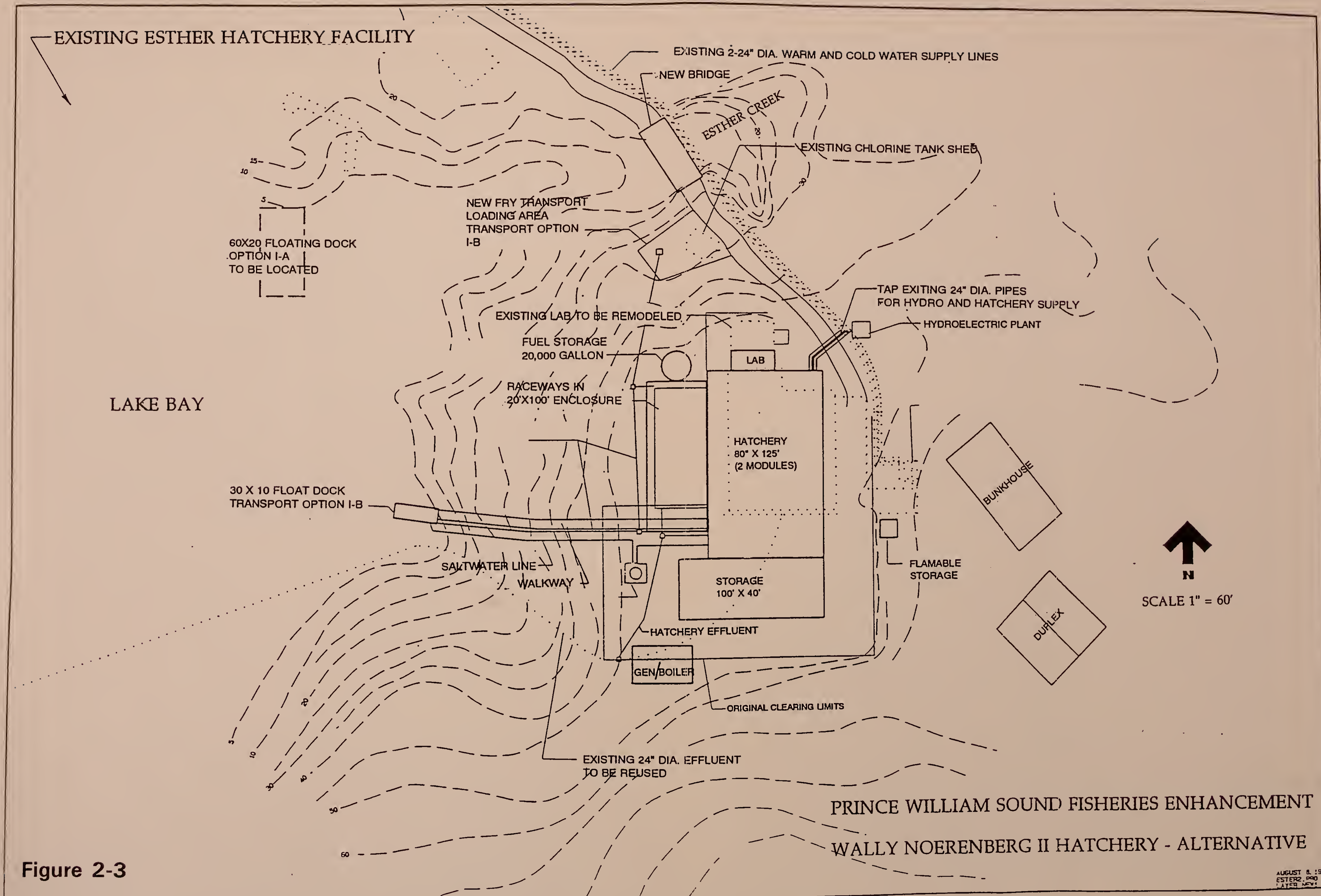

EXISTING ESTHER HATCHERY FACILITY
EXISTING 2-24" DIA. WARM AND COLD WATER SUPPLY LINES
NEW BRIDGE
ESTHER CREEK
EXISTING CHLORINE TANK SHED
NEW FRY TRANSPORT LOADING AREA TRANSPORT OPTION I-B
60X20 FLOATING DOCK OPTION I-A TO BE LOCATED
TAP EXITING 24" DIA. PIPES FOR HYDRO AND HATCHERY SUPPLY
HYDROELECTRIC PLANT
EXISTING LAB TO BE REMODELED
FUEL STORAGE 20,000 GALLON
LAB
RACEWAYS IN 20'X100' ENCLOSURE
LAKE BAY
HATCHERY 80" X 125' (2 MODULES)
BUNKHOUSE
30 X 10 FLOAT DOCK TRANSPORT OPTION I-B
SALTWATER LINE
WALKWAY
STORAGE 100' X 40'
FLAMABLE STORAGE
N
SCALE 1" = 60'
DUPLEX
HATCHERY EFFLUENT
GEN/BOILER
ORIGINAL CLEARING LIMITS
EXISTING 24" DIA. EFFLUENT TO BE REUSED
PRINCE WILLIAM SOUND FISHERIES ENHANCEMENT
WALLY NOERENBERG II HATCHERY - ALTERNATIVE

Figure 2-3

Incubation Space

Incubation space planned for conversion to sockeye salmon production is currently setup for pink salmon production. Expansion of the facility would require the remodelling of incubation areas, and replacement of some pink salmon incubation facilities with equipment and areas designed for sockeye salmon production. Incubation areas would be slightly enlarged to accommodate for the additional 10 cfs of water per day that would be necessary for sockeye salmon production.

Water Supply Requirements

The Esther Island Hatchery is permitted to draw 80 cfs of water per day from Esther Lake under a water right to PWSAC to support hatchery operations. The facility currently utilizes only 70 cfs of water per day. The conversion of a portion of pink salmon production to sockeye salmon would require that the hatchery draw the currently non-utilized portion, 10 cfs, of their permitted allocation of water from Esther Lake, for use in the expanded production of sockeye salmon.

Water supply is currently provided from Esther Lake using a two pipe system (36 inch deep intake and 30 inch shallow intake). No new water intake pipelines would be needed under this alternative. The existing water supply pipeline has sufficient excess volume capacity to supply the added 10 cfs of water per day. Modification of piping leading to the new hydroelectric unit and to enlarged incubation areas would be necessary. Stream outflow from Esther Lake currently ceases for occasional periods of days to months during the winter and spring. This condition would slightly increase.

Power Generation

Plans would call for the installation of a hydroelectric unit capable of producing approximately 24 kw of the total facility need of 200 kw. If installed, water would be piped from Esther Lake (with an elevation of 115 ft. above mean lower low water). Accounting for loss of head pressure due to pipe diameter and pipe fittings, the available head for power generation would be approximately 34 ft. The remaining power needs for the facility would be provided by existing diesel generators.

Waste Water Effluent

Discharge of both hatchery effluent and domestic waste water would be done in accordance with State and Federal regulations. Hatchery effluent waters would be discharged into saltwater via a diffuser in deep water away from existing rearing pens. Domestic wastewater is treated with a 0.5 mg/l dosage of chlorine for a five minute contact time before discharge. Other additions to the effluent would include iodophor and chlorine bleach. Effluent from the hatchery will include waste products from salmon fry and eggs. Such waste will include elevated nitrogen and phosphorus.

The current average hatchery incubation/rearing effluent wastewater discharge volume of approximately 56.3 cfs could increase by a maximum of approximately 10 cfs. Additional domestic waste water from the expanded living quarters would be treated in a newly installed septic tank system using no chemicals. It is estimated that approximately 240 gpd would be treated in the new system. Adding to the existing discharge of approximately 650 gallons, the estimated total domestic discharge for the remodeled facility would be 890 gpd.

Housing and Infrastructure

The increase in the basic production capacity of the facility would require that the supporting services at the facility be improved to accommodate and house the increased staff, power, and equipment needs.

Both permanent and temporary staff requirements would increase with the expanded facility. Approximately one new permanent and two temporary staff members would be added. A new bunkhouse and duplex would be built on existing pads.

Construction Sequence

Construction would occur over a 1.5-2 year time period and would be planned such that disruptions to the existing hatchery would be minimized. The existing hatchery would remain in operation throughout the construction period.

Sitework would begin with clearing existing structures and grading of the site as required for the new hatchery building, new power plant building, new bunkhouse, and new duplex. The new duplex would require piling installation.

All electrical, mechanical and utilities work associated with the new structures would also be completed. New turbines, generators, and all associated controls in the powerhouse would be installed. All necessary connections to the new hatchery building, including supply lines, drains, and overflows would be installed.

2.4.3 Expansion of Existing Production

The expansion of production at the Esther Island Hatchery to include sockeye salmon would require expanding remote eggtake and remote release activities.

Remote Eggtake Activities

The procedures for eggtake activities under this alternative would be the same as those under the Main Bay Alternative and consistent with ADF&G procedures. Sockeye salmon eggs would be collected in the Coghill and Eshamy systems, both of which are in the WSA. No eggs would be collected from the Eyak system under this alternative. The number of eggs collected from the Coghill and Eshamy systems would be the same as those collected under the Main Bay Alternative. Transportation to and from these sites would be by fixed-wing aircraft. The

number of fixed-wing aircraft support flights would be the same as those proposed per site under the Main Bay Alternative, though there would be one less eggtake site. No remote site housing accommodations would be necessary for hatchery personnel during remote egg-take activities.

Remote Fry Release Activities

Fry would be released in the Coghill and Eshamy systems, and other potential candidate lake remote release sites where there are currently no wild sockeye salmon returns. Sockeye salmon fry targeted for remote release will be transferred directly from hatchery freshwater raceways to freshwater lake release locations via freshwater transfer tanks aboard fixed-wing aircraft. Approximately 1-3 fixed-wing aircraft flights would be necessary per lake plant. No remote site housing accommodations would be necessary for hatchery personnel during remote fry release activities at the release lake sites.

Fisheries Enhancement Goal

The converted Esther Island Hatchery would be able to incubate up to 13 million green eggs from two stocks of sockeye salmon based on approval of early and late stocking sites. The stocks to be utilized would be from the Coghill and Eshamy areas. These would be available to the fisheries from mid-June to the end of August. Eyak stocks would not be utilized since they are currently being handled at the Main Bay Hatchery and since approval of remote release sites for this stock would be unlikely. Compared to the Main Bay alternative, only fry could be produced. Smolt rearing facilities would not be possible because of water limitations and disease considerations.

After conversion to sockeye salmon production, the hatchery would produce 9.4 million fry (4.7 million Coghill stock and 4.7 million Eshamy stock). This production could result in an adult return of approximately 1-1.2 million adult sockeye salmon. For this report a figure of one million returning adult sockeye salmon would be assumed since survival to adult at various stocking sites may vary.

Based on approval of stocking lakes, fry would be released at Coghill and Eshamy as well as other candidate lakes to provide added fishing opportunities and assure spawning escapement to the lakes (Coghill and Eshamy). Some candidate lakes have no available access from marine waters. These lakes will require annual fry stocking for production of adult sockeye salmon. Since there would be no release at the Esther Island Hatchery, no returns are expected there.

The hatchery would have to conduct remote brood stock collection. It is assumed that a cost recovery fishery would be proposed at candidate lakes with the exception of Coghill and Eshamy lakes. It is anticipated that about 30% of the returning adults would be used for brood stock and cost recovery.

Years to Achieve Hatchery Capacity

The converted hatchery would have a capacity of approximately 13 million green sockeye salmon eggs. Until full production, there would not be sufficient brood stock available from donor streams to meet hatchery capacity. It is likely full production would be reached during 1996-97.

On-station Production

Present plans call for no returns to the Esther Island Hatchery since cost recovery and brood stock management at the hatchery site would be unacceptable from a fish culture and disease standpoint. Due to pathology concerns, ADF&G would not permit sockeye salmon adults returning to the Esther Island Hatchery since they would be mixing with chum and chinook salmon, both of which are susceptible to IHNV infection.

Off-station Production

The goal is to release 4.7 million Coghill (early) stock sockeye salmon in the Coghill District and 4.7 million Eshamy (late) stock sockeye salmon. This would serve two purposes: 1) provide for expanded area of fishing opportunity; 2) assure that spawning escapement to Coghill and Eshamy lakes are maintained. Other candidate lakes for stocking sockeye salmon fry would be selected by ADF&G through the annual management planning process.

2.5 NO ACTION ALTERNATIVE

2.5.1 Introduction

Under the No Action alternative, there would be no alteration to either the Main Bay or the Esther Island hatcheries; each of these facilities would continue to operate within the confines of current permitting.

2.5.2 Existing Facilities

Under the No Action alternative there would be no expansion of the facilities at either the Main Bay or Esther Island hatcheries.

The existing Main Bay Hatchery is an approximately 14 acre facility that consists of the hatchery building (21,600 ft^2), three residences, a sewage treatment facility, a storage shed, an incinerator, a powerhouse, and a work shop. In addition to the facility buildings there is a water pipeline from Main Lake to the hatchery, a barge landing, and a holding pond with a small dam.

Power Generation

Both the Main Bay Hatchery and the Esther Island Hatchery have hydroelectric power units with diesel generator backups. The Main Bay facility is permitted to draw 20 cfs of water per day from Main Lake for hydropower generation and hatchery incubation requirements. The Esther Island facility is permitted to draw 80 cfs of water per day for hydropower generation and incubation requirements.

Staffing

Staffing requirements at both the Main Bay and Esther Island hatcheries would remain at their current levels under the No Action Alternative.

Approximately 10 people, including employees and families, live on-site at the Main Bay Hatchery year-round. During June and July, the temporary work force causes the total population to increase to 19 and 21, respectively.

Approximately 10 people, including employees and families, live on-site at the Esther Island fish hatchery year-round. During the summer months, the temporary work force ranges from 25 to 39 employees.

Remote Eggtake Activities

Personnel from the Main Bay Hatchery fly via fixed-wing aircraft annually to the Coghill, and Eshamy river systems to collect sockeye salmon eggs for brood stock development at the hatchery. In 1992 eggtakes were conducted at Eyak (100,000 eggs), Coghill/Davis (2.5 million eggs), and Eshamy (2 million eggs) systems; and from the Special Harvest Area near the hatchery (2.5 million eggs).

The Esther Island Hatchery eggtake activities for 1992 included 188 million pink salmon eggs taken from hatchery brood stock returns, 111 million chum salmon eggs taken from hatchery brood stock returns, one million chinook salmon eggs taken from hatchery brood stock returns, and 2.5 million coho salmon eggs from the Eyak system. Overnight accommodations for hatchery field technicians were not necessary for eggtake operations at either hatchery.

Remote Release Activities

Fry at the Main Bay Hatchery are freshwater-reared and released at the hatchery as well as in the Coghill and Eshamy systems. There are no annual remote release activities at the Esther Island Hatchery. All salmon species are reared in freshwater raceways on site and released into Lake Bay. Occasionally smolts are transferred by barge to an ADF&G approved remote release site. In 1991, 20,000 one-year-old chinook salmon smolts were transferred and released at Fleming Spit near Cordova.

Enhancement Goal

Both the Main Bay and Esther Island hatcheries are at their planned enhancement goals. The production at the Main Bay Hatchery (before proposed expansion) is 5 million smolts a year. The production at the Esther Island Hatchery is 188 million pink salmon, 111 million chum salmon, 1 million chinook salmon, and 2.5 million coho salmon per year.

Years to Achieve Hatchery Capacity

Both the Main Bay and Esther Island hatcheries are at their permitted production levels.

On-station Production

The Main Bay Hatchery, which converted its production exclusively to sockeye salmon in 1987, incubates approximately 7.3 million eggs annually, producing about 5 million smolts of which 1 million will return. The 1992 eggtakes were conducted at Eyak, Coghill/Davis, and Eshamy lakes; and from the Special Harvest Area near the hatchery. Eggs would continue to be incubated at existing facilities within the hatchery.

The Esther Island Hatchery (WNH I and WNH II) produces pink, early chum, chinook, and coho salmon. The eggtake for 1992 included 188 million pink salmon eggs, 111 million chum salmon eggs, one million chinook salmon eggs, and 2.5 million coho salmon eggs. The eggtakes were conducted on-site with the exception of the coho salmon eggs being collected at Eyak Lake.

Off-station Production

Fry at the Main Bay Hatchery are freshwater-reared and released at the hatchery as well as in the Coghill and Eshamy systems. Returning adults are harvested for common property fisheries, cost-recovery fisheries, and for broodstock. Details of the hatchery plan are given in the 1992 Annual Management Plan.

At the Esther Island Hatchery, pink and chum salmon fry are reared for a short period (2-10 weeks) in freshwater raceways and released into saltwater. Coho and chinook salmon fry are reared in indoor and outdoor raceways and held until the following spring and released at the smolt stage. Returning adults are harvested for common property fisheries, cost-recovery fisheries, and for broodstock.

2.6 SUMMARY COMPARISON OF ALTERNATIVES

The Main Bay Hatchery expansion alternative would produce approximately 4 million returning sockeye salmon annually by 1996 from the release of approximately 20 million smolts. Approximately 28.3 million green sockeye salmon eggs would be collected from Eyak, Coghill, and Eshamy stream systems for incubation at the hatchery (See Section 2.3.3). Release of hatchery produced smolts would include 12.5 million smolts into Main Bay, 5 million to Coghill

District, and 2.5 million to Eshamy Bay and candidate lake systems. Remote release activities (outlined in Section 2.3.3) would last from 2-3 weeks at each release site. This alternative is expected to generate approximately $30 million in sockeye salmon to gillnetters and seiners.

Capital construction costs for expansion of the Main Bay Hatchery would be about $20 million dollars. Construction activities would take place over a two year period. Expansion activities are detailed above in Section 2.3.2 and include construction of a new hatchery building, additional housing, additional incubation and rearing space, expansion of the saltwater net-pen area, installation of new utility lines and a hydroelectric generator unit, and supplementing the facility staff.

The Esther Island Hatchery expansion alternative would produce approximately 1 million returning sockeye salmon annually by 1996-97 from the release of approximately 9.4 million fry Approximately 13 million green sockeye salmon eggs would be collected from the Coghill and Eshamy stream systems for incubation at the hatchery (See Section 2.4.3). Release of hatchery produced fry would occur completely off-site at Coghill Lake and Eshamy Lake. Release activities would not require extended stay accommodations. This alternative is expected to generate approximately $7.7 million in sockeye salmon to gillnetters and seiners.

Capital construction costs for renovating the Esther Island Hatchery to include sockeye salmon production would be approximately $9.6 million dollars. Construction activities would take place over a 1.5-2 year period. Expansion activities are detailed above in Section 2.4.2 and include partial demolition and reconstruction of existing facility structures, installation of new utility lines and a new hydroelectric power unit. Facility staffing would also be supplemented.

The No Action Alternative would leave current production levels at the Main Bay and Esther Island hatcheries unchanged. Main Bay produces approximately 1 million returning sockeye salmon annually from the release of approximately 6 million smolts. Approximately 7.3 million sockeye salmon eggs are collected annually at Eyak, Coghill/Davis and Eshamy Lakes. Sockeye salmon production at Main Bay generates approximately $8.8 million annually to gillnetters and seiners. The Esther Island Hatchery produces pink, chum, chinook, and coho salmon only. Details of the hatchery plan are given in the 1992 Annual Management Plan.

As a summary to Sections 2.3 and 2.4, Table 2-1 compares the primary actions taken under each alternative and summarizes the major features of each in terms of their individual contribution to a sockeye salmon enhancement program in western Prince William Sound.

TABLE 2-1
SUMMARY COMPARISON OF THE ALTERNATIVES

	Main Bay Alternative	Esther Island Alternative	No Action Alternative
Expansion of rearing/incubation space	Incubation space would be doubled to accommodate an additional 10 million smolts. Addition of approximately 9,000 m^3 of saltwater rearing area, from 20 40' x 40' netpens and floating dock constructed in Main Bay.	Incubation space would be increased to accommodate an additional 10 cfs of water per day; the increase required to convert from pink production to sockeye.	Rearing and incubation space at Main Bay and Esther Island would not change.
Expansion of water supply system	Capacity of system would be approximately doubled. Addition of a second deep water intake line, a second parallel pipeline from the lake to the hatchery. Enhancement of the water distribution system (piping).	No expansion of existing permitted water supply system planned. Enhancement of water distribution system to accommodate sockeye replacing pink production.	No expansion planned; Main Bay would continue to operate at 20 cfs supplied by two intake lines and a 30" pipeline from the lake to the hatchery. Esther Island would continue to operate at 80 cfs supplied by two intake pipelines.
Expansion of power generation	Construction of a new hydroelectric power facility. Addition of new pump turbines and associated controls. Expansion of emergency backup diesel generator capacity.	Installation of an additional hydroelectric unit capable of producing 24 kW of the facility's 200 kW needs.	No expansion planned. Main Bay would continue to operate off a single turbine hydroelectric generator with diesel generator emergency backup. Esther Island would continue to operate off hydroelectric and diesel power with diesel emergency backup.

TABLE 2-1
SUMMARY COMPARISON OF THE ALTERNATIVES
(Continued)

	Main Bay Alternative	Esther Island Alternative	No Action Alternative
Expansion of effluent treatment systems	Installation of a new septic tank system treating an additional 240 gpd of domestic wastewater. Hatchery effluent wastewater volumes discharged into Main Bay would increase an average by 9.2 million gpd. Expanded total discharge volume average of 18.4 million gpd.	Installation of a new septic tank system treating an additional 240 gpd of domestic wastewater. Hatchery effluent wastewater volumes discharged into Lake Bay could increase by a maximum of approximately 6.5 million gpd. Current volumes of effluent wastewater discharged average approximately 36 million gpd.	No expansion planned. Main Bay would continue to operate using the existing treatment system. Hatchery effluent wastewater would remain on average 9.2 million gpd. Esther Island would continue to operate using the existing treatment system. Hatchery effluent wastewater would remain on average 36 million gpd.
Annual increased remote eggtake activities	An additional 10.5 million eggs would be collected from the Eyak, Coghill and Eshamy River systems. Involves 6 to 7 hatchery employees making approximately 8 to 12 fix-wing aircraft roundtrips to each site over a 1 to 3 week period.	New eggtakes would be conducted at the Coghill and Eshamy systems. Approximately 10.5 million eggs would be collected. The number of technicians, length of time spent on site and aircraft support would be the same as the Main Bay alternative.	No increases in remote eggtake activities at either site. 4.5 million sockeye eggs are collected annually from the Eyak, Coghill and Eshamy river systems. Activities involve 5 to 6 technicians making approximately 6 to 10 fix wing aircraft roundtrips to each site over a 1 to 3 week period. Esther Island would continue to collect eggs from brood stock returns to the hatchery and from the Eyak system for Coho eggs.

TABLE 2-1
SUMMARY COMPARISON OF THE ALTERNATIVES
(Continued)

	Main Bay Alternative	Esther Island Alternative	No Action Alternative
Increased annual remote release activities	Smolts would be reared in 40' x 40' x 10' saltwater netpens at the Coghill, Eshamy and candidate release sites for a period of 2 to 3 weeks. 2 to 3 hatchery technicians would remain on site on anchored vessels. 2 to 3 fixed-wing aircraft roundtrip flights would be necessary to support activities.	Fry would be remote released into candidate lakes where currently there are no returns of salmon. 1 to 3 fixed-wing aircraft roundtrips would be required per lake plant. No remote site housing would be necessary.	No increase in remote release activities are planned for either Main Bay or Esther Island hatcheries. Main Bay would continue to conduct remote release activities at Coghill and Eshamy at current production levels. Staff requirements, duration of activities, and support from aircraft would be the same as the Main Bay alternative. There are currently no annual remote release activities at the Esther Island hatchery.

TABLE 2-1
SUMMARY COMPARISON OF THE ALTERNATIVES
(Continued)

	Main Bay Alternative	Esther Island Alternative	No Action Alternative
Adult Production	4 million adult sockeye salmon from 28.3 million green sockeye eggs producing approximately 20 million smolts for release to saltwater pens.	1 million adult sockeye salmon from 13 million green sockeye eggs producing 9.4 million fry for fresh water release.	The Main Bay Hatchery will continue to incubate approximately 7.3 million sockeye eggs, producing about 6 million smolts of which 1 million will return. Releases will occur at the Eshamy and Coghill River systems as well as at Main Bay. Egg takes would continue at Eyak, Coghill/Davis and Eshamy Lakes; and from the Special Harvest Area near the hatchery. The Esther Island Hatchery will continue to produce pink, early chum, chinook and coho salmon. Approximately 188 million pink salmon eggs, 111 million chum salmon eggs, 1 million chinook salmon eggs, and 2.5 million coho salmon eggs will be incubated. Details of the hatchery plan are given in the 1992 Annual Management Plan.
Years to achieve hatchery capacity	Full production after 1996.	Full production likely in 1996-97.	

TABLE 2-1
SUMMARY COMPARISON OF THE ALTERNATIVES
(Continued)

	Main Bay Alternative	Esther Island Alternative	No Action Alternative
Main Bay Release	5 million Coghill stock smolts 2.5 million Eshamy stock smolts 5 million Eyak stock smolts	No returns to Esther Island Hatchery.	
Remote Release	5 million Coghill stock smolts to Coghill district locations and 2.5 million Eshamy stock smolt to Eshamy Bay and candidate lakes.	4.7 million Coghill (early) stock sockeye in the Coghill district and candidate lakes. 4.7 million Eshamy (late) stock sockeye.	
Remote egg take schedules	Eyak Lake (June 10-June 20) Coghill Lake (August 10-August 31) Eshamy Lake (October 7-October 28)	Coghill Lake (August 10-August 31) Eshamy Lake (October 7-October 31)	
Annual Hatchery Operating Cost	$1.2 million	$0.8 to 1.0 million	$0.8 million
Capital Construction Cost	$20 million	$9.6 million	No Construction Costs
Fishery Contribution Projection	$30 million in sockeyes to gillnetters and seiners	$7.7 million in sockeyes to gillnetters and seiners	$8.8 million in sockeyes to gillnetters and seiners
Annual Hatchery Cost Recovery Plan	Harvest of 30% of Main Bay returns to provide approximately $15 million in revenue	Harvest of 30% of the returns to candidate lakes to provide approximately $3.8 million	Harvest of 30% of Main Bay returns to provide approximately $1.2 million

2.7 MONITORING

The Main Bay Hatchery Expansion alternative provides for monitoring of water quality including waste water, waste under net pens, carcass disposal, medication and disease control chemicals, and mixing zones. These requirements are covered under the General Waste Disposal Permit administered by Alaska Department of Environmental Conservation (ADEC) (Appendix 2-1). This permit addresses the location and frequency, standards, and responsibilities for monitoring activities. Similar requirements would apply to the Esther Island alternative.

In addition to water quality and related hatchery practices, fish stocks will also be monitored. The protection of wild stocks of sockeye salmon from overfishing in mixed fisheries and genetic introgression with hatchery stocks are concerns addressed in extensive monitoring agreements drafted between PWSAC and ADF&G. Monitoring results are reviewed annually by the Regional Planning Team (RPT). The RPT, consisting of ADF&G and PWSAC appointees (Alaska Statutes 5 AAC 40.300) and ex-officio members including Forest Service representatives, annually review regional production and amend the regional plan based on "new knowledge and ideas and changing conditions" (RPT State Charter). This process assures protection of wild stocks.

For either facility alternative, stock identification studies, evaluations, and monitoring may be conducted as required. Specific agency responsibilities are reviewed annually. Monitoring and evaluations may include coded wire tagging and scale pattern analysis, test fishing and other studies.

More specifically, hatchery returns would be monitored to maintain wild stock escapement in the Coghill and Eshamy systems. Test fishing efforts as well as coded wire tagging or other marking techniques, as well as scale pattern analysis evaluations associated with remote release sites would be performed to minimize impact to wild stocks. There would also be monitoring of adult escapement by ADF&G at the weirs on Coghill and Eshamy rivers. Efforts would also be directed to maintaining the timing of the runs of the three brood stocks (Eshamy, Coghill, and Eyak).

Under both alternatives, the hatchery operators would adhere to the guidelines of the State Genetic Policy (ADF&G 1985). This policy provides mechanisms for enhancement programs to propose and implement production and releases taking into account the benefits of the enhancement activity while considering potential detrimental effects. Brood stock selection criteria, fish transport and release procedures and permitting, wild stock rehabilitation guidelines, and fish culture criteria to maintain genetic diversity in hatcheries are contained within the policy.

Water levels at Main Lake, under the Main Bay alternative, and Esther Lake, under the Esther Island alternative, would also be monitored by PWSAC as part of normal hatchery operations.

2.8 MITIGATION

The location for the original Main Bay Hatchery was chosen to avoid impacts to fish habitat from reduced flow in Main River due to water withdrawal for hatchery operations. The same benefits for avoiding impacts would apply to expansion of the hatchery. Additional mitigation measures would be established under both the Main Bay and Esther Island alternatives. These measures would address impacts to wetlands, visual quality, noise and air pollution, salmon juvenile competition, and wild stock interception.

Under the Main Bay Hatchery Expansion alternative plans for location of new structures have been altered to minimize the extent of gravel fill on wetlands. This would take the form of re-positioning buildings and culverting to maintain flow characteristics. The site would also be planned such that the number of trees to be removed would be minimized. The additional water pipeline would be constructed parallel to the existing one, consequently no clearing would be required. This would reduce additional visual contrasts and effects on other resources.

Under the Esther Island alternative, construction activities would entail the demolition of old and reconstruction of new facilities on existing foundation pads. There would be no construction on previously undisturbed ground. Current plans do not include any gravel fill or construction activities in wetlands.

At both hatchery sites, the visual effects of the facilities on the apparent naturalness would be minimized by the use of construction materials with colors and textures that blend with the natural character of the surrounding area. This would make the facilities less evident to backcountry users.

Currently, the Main Bay Hatchery relies on hydroelectric generation as the primary source of power. In order to capitalize on additional hydroelectric power potential and to reduce noise and air emissions, new and larger hydroelectric turbines would be used.

As required in the Forest Service special use permit (Forest Service 1980b), in the event that archeological or historic resources are discovered during site preparation or construction activities at either the Main Bay or Esther Island hatchery, all operations would cease and the Forest Service archeologist and the State Historic Preservation Office would be notified. The site would be treated in accordance with the requirements of the National Historic Preservation Act of 1966, Executive Order 11593 of 1971, and 36 CFR 800, the procedures for the Protection of Historic and Cultural Properties.

For both hatchery alternatives there would be additional sockeye salmon juveniles produced (14.9 million at Main Bay and 9.4 million at Esther Island). This increment may have an adverse impact on wild stocks by increasing food resource competition stocks and by interfering with the discreetness of stocks. To minimize the impacts to wild stocks, hatchery-reared sockeye salmon would be released during times of peak zooplankton abundance. These abundances would be determined during bi-weekly sampling surveys at release sites. This release strategy would be designed to increase survivorship to the hatchery-reared stocks and to

reduce competitive interactions between hatchery and wild stocks. Losses in wild fish stocks or their habitat (described in Section 3.2 and 4.1.2) and production on Main River would be mitigated by the production of salmon at the hatchery.

Interaction of wild and hatchery stock may also occur during adult return and commercial fishing activities. Under the Main Bay alternative, the remote release sites at Nelson Bay, Port Chalmers, Kings Bay, and Barry Arm would be used since they contain no wild sockeye salmon stocks. The timing of the enhanced returns at these sites would not create a mixed stock fishery potentially detrimental to a particular wild stock.

At the Coghill and Eshamy remote release sites only F_1 generation fry (the immediate offspring of wild stock) would be released. This would be done to reduce genetic introgression and problems associated with inbreeding associated with using hatchery stock for remote releases.

2.9 IDENTIFICATION OF THE PREFERRED ALTERNATIVE

Expansion of the Main Bay Hatchery is identified as the preferred alternative. Expansion activities would include some gravel fill, construction of additional buildings, and a small addition to the staff. Sockeye salmon eggs would be collected in the Eyak, Coghill, and Eshamy systems; and smolt (juvenile salmon) would be released at the hatchery, in the Coghill and Eshamy systems; and other potential remote release sites where there are currently no wild sockeye salmon returns.

3.0 AFFECTED ENVIRONMENT

3.0 AFFECTED ENVIRONMENT

This chapter describes the environmental resources associated with the proposed hatcheries, the remote release sites, and eggtake sites, as well as other outlying areas that would potentially be affected. The resources include the relevant physical, biological, social, economic, and subsistence conditions that could change under implementation of an alternative, and/or background information that may assist a reader in understanding the alternatives.

3.1 VEGETATION AND WETLANDS

Main Bay Hatchery

Plant communities in the vicinity of the Main Bay Hatchery are typical of coastal western hemlock-Sitka spruce forests. The site includes belts of hemlock-Sitka spruce forest interspersed with muskeg and tundra with many shrubs and dwarf trees. The dominant tree species are mountain hemlock (Tsuga mertensiana) and Sitka spruce (Picea sitchensis). The understory is mainly Sitka alder (Alnus crispa sinuata) and early blueberry (Vaccinium ovalifolium). Ferns and mosses are found along with other plants in the herbaceous layer. There are many open areas of muskeg and meadow near Main Lake (Forest Service 1980a). Plant species commonly associated with coastal western hemlock-Sitka spruce forests are listed in Table 3-1.

A marine vegetation survey at the head of Main Bay was conducted by ADF&G in the summer of 1978 (Forest Service 1980a). This survey documented plant communities consisting almost exclusively of Fucus sp., a marine algae usually associated with rocky intertidal beaches. Eelgrass (probably Zostera marina) was found in the deeper water of the bay.

At the Main Bay Hatchery, within the boundary of the proposed expansion, several areas of wetlands have been identified (Adolfson Assoc., Inc. 1991). A total of eight identifiable wetland areas are present within the proposed expansion area of the Main Bay Hatchery (Figure 3-1). As described in Adolfson Assoc., Inc. (1991), "Wetlands A and B are muskegs totalling 0.31 acres. Wetlands A and C are linear and contain channelized flowing water within their boundaries. Wetlands C,D and E total 0.06 acres, and are characterized by hydrophytic vegetation and hydric mineral soils with small sphagnum peat pockets. Wetlands F and H are relatively large. Only those portions of these two wetlands that occur in areas of proposed impacts have been delineated; for this reason no total wetland area can be calculated for the study site. Wetland F is a mosaic of muskeg, small freshwater ponds and tiny streams, and small 'islands' of forested upland. Wetland G and the portion of wetland H that has been delineated and surveyed are disturbed areas. All of the wetlands within the study area are classified by the Fish and Wildlife Service (USFWS) as palustrine emergent wetlands (PEM). Wetlands B and F also have palustrine open water components (POW), whereas A and C contain areas of palustrine rock bottom, rubble (PRB2)."

TABLE 3-1

Flora commonly associated with coastal western hemlock-sitka spruce forests. Data from the Arctic Information and Data Center, 1974. Taxonomy follows Hulten (1968).

Common Name	Scientific Name
Sitka spruce	Picea spicant
Mountain hemlock	Tsuga mertensiana
Sitka willow	Salix sitchensis
Sitka alder	Alnus crispa sinuata
Salmonberry	Rubus spectabilis
Devil's club	Echinopanax horridum
Copperbrush	Cladothamnus pyrolaeflorus
Rusty menziesia	Menziesia ferruginea
Dwarf blueberry	Vaccinium caespitosum
Early blueberry	Vaccinium ovalifolium
Bog blueberry	Vaccinium uliginosum
Pacific red elder	Sambucus racemosa
Western hemlock	Tusga heterophylla
Lichens	
Mosses	
Liverworts	

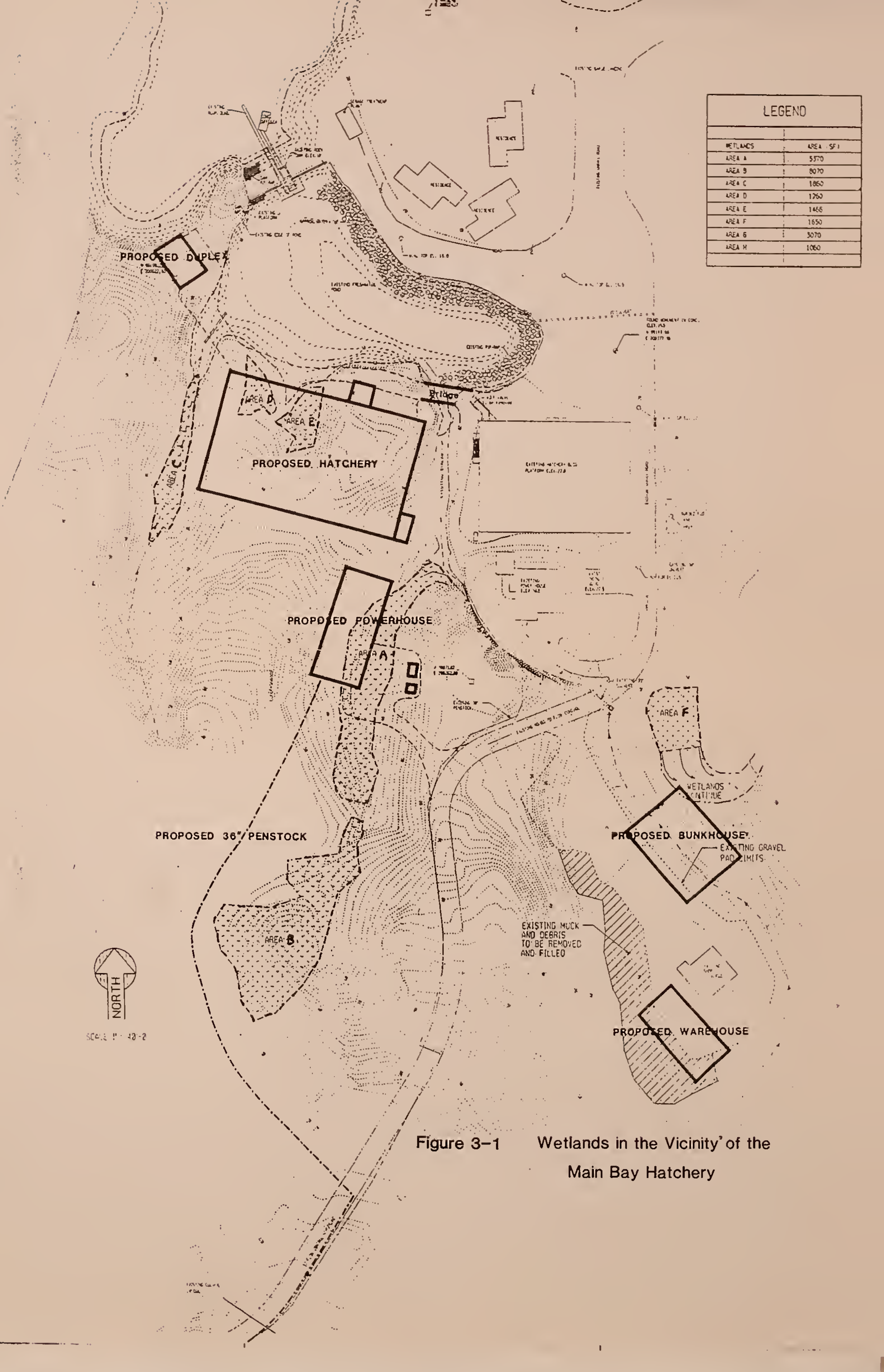


Figure 3–1 Wetlands in the Vicinity of the Main Bay Hatchery

The functional values of existing wetlands, in terms of biological support, hydrologic support, water quality and flood control, were determined in a 1991 wetlands investigation (Adolfson Associates, Inc. 1991). The investigation found that wetlands A, B, and C had "low" to "moderate" functional values based primarily on their small sizes. Wetlands D, E, G, and H all have "low" functional values based solely on their small size (all are less than 0.07 acres). Wetland F is part of a larger wetland system that extends beyond the study area. Wetland F received an overall rating of "moderate" to "high".

Plant communities in the vicinity of the remote eggtake and release sites are typical of those found throughout western Prince William Sound in coastal western hemlock-Sitka spruce forests.

Esther Island Hatchery

The Esther Island Hatchery was built primarily on gravel fill atop a granite tidal flat thus disturbing relatively small areas of vegetation. Vegetation surrounding the Esther Island Hatchery is similar to that found at Main Bay.

In general terms the flora can be described as coastal Western hemlock-Sitka spruce forest. Table 3-1 lists plant species commonly occurring in Western hemlock-Sitka spruce forests and includes species found around the Esther Island Hatchery.

Most of the area around the hatchery is classified as uplands which may include unclassified wetlands such as human-modified areas. Small wetland areas identified in the area consist of palustrine emergent wetlands (PEM), palustrine forested wetlands (PFO), palustrine unconsolidated bottom wetlands (PUBH), and palustrine aquatic bed wetlands (PAB).

Plant communities in the vicinity of the remote eggtake sites are typical of those found throughout western Prince William Sound in coastal western hemlock-Sitka spruce forests.

3.2 FISH AND WILDLIFE

Main Bay Hatchery

A variety of mammals occur in the Main Bay vicinity although few have been noted on site. A listing of mammals whose range and habitats include Main Bay and nearby areas of Prince William Sound is provided in Appendix 3-1.

Black bear (Ursus americanus), and Sitka black-tailed deer (Odocoileus hemionus sitkensis) are the only big game animals occurring in the Main Bay vicinity. No known black bear denning sites are located in immediate vicinity of the hatchery; however, bears occasionally occupy areas in and around the hatchery site, especially during adult salmon return. Since the beginning of operations, no black bear conflicts at the Main Bay Hatchery have resulted in the taking of a bear.

Furbearers and small mammals which could be found in the general vicinity include the river otter (Lutra canadensis), wolverine (Gulo gulo), mink (Mustela vision), marten (Martes americana), weasel (Mustela sp.), shrew (Sorex sp. and Microsorex sp.), and vole (Microtus sp. and Clethrionomys sp.)(Forest Service 1980a).

A variety of marine mammals occur in and near Main Bay. Killer whales (Orcinus orca) have been observed in the mouth of Main Bay but are more common around Chenega Island and Naked Island (Forest Service 1980a). Minke whales (Balaenoptera acutorostrata) are frequently seen in Perry Passage in the spring, summer, and fall (Forest Service 1980a).

The fin whale (Balaenoptera physalus) and humpback whale (Megaptera novaeangliae) in Prince William Sound are both on the Federal endangered and threatened list (Federal Register 1978a). Fin whales are usually confined to Hinchinbrook Entrance and the corridor that leads to and around Naked Island. Humpback whales use Knight Island Passage heavily in early summer, to get from the Naked Island area down to Icy Bay and Whale Bay near Chenega (Hall 1978).

Other marine mammals in the area include dall porpoise (Phocaena dalli), harbor porpoise (Phocaena phocaena), harbor seal (Phoca vitulina), sea otter (Enhydra lutris), and sea lion (Eumetopias jubata). There is a sea lion haul-out area on the southern tip of Perry Island about 13 miles from the site (ADF&G 1973). Point Eleanor, on Eleanor Island approximately 14 nautical miles (nm) east of the mouth of Main Bay, is also a haul-out area (Forest Service 1980a).

A list of bird species occurring in the North Gulf Coast region of Alaska is included in Appendix 3-2. This list also outlines preferred habitat types as well as breeding records. Since the area surrounding the hatchery contains a variety of habitat types including forests, bogs, marine and freshwater shores, tidal flats, and offshore waters, it is likely inhabited by a wide variety of birds.

Peregrine falcons (Falco peregrinus), which are on the Federal endangered and threatened species list (Federal Register 1978a), have been documented as using Prince William Sound as a major flyway (University of Alaska, AEIDC 1974). Bald eagles, a protected species, are known to occur within Main Bay and two nesting sites have been documented along the northeast shore of Main Bay approximately two miles from the hatchery (J. Bernatowicz, USFWS, pers. comm.).

Main Bay appears to provide feeding and resting habitat for waterfowl and seabirds; however, nutrient-poor Main Lake provides little aquatic food for waterfowl (Forest Service 1980a). Geese use the meadows at the south end and west side of the lake (Forest Service 1980a). No seabird colonies or concentration sites have been identified in Main Bay (Forest Service 1980a).

Spawning data for Main River, recorded in the late 1970s showed that approximately 1,000 pink salmon and less than 10 sockeye salmon annually utilized Main River (Forest Service

1980a). Currently hatchery operations require a barrier seine which blocks the mouth of Main River preventing fish from entering the river. This allows selection of the brood stock to meet the State genetic policy requirements. Because of this no natural run of salmon currently exists in Main River. It should also noted at this point that infectious hematopoietic necrosis (IHN) virus naturally occurs in sockeye stocks in Alaska and will be discussed in Chapter 4.0.

Main Lake, likely due to its oligotrophic (low nutrient) nature, supports very few fish; a small number of Dolly Varden are known to exist. Fish resources in the vicinity of Main Bay are considered an insignificant contributor to salmon production in Prince William Sound.

Invertebrates found or suspected to be present in upper Prince William Sound including Main Bay (Howse 1975) are provided in Appendix 3-3.

Fish and wildlife in the vicinity of the remote eggtake and release sites are representative of species found within the Prince William Sound area.

Esther Island Hatchery

The wildlife found in the vicinity of the Esther Island Hatchery is similar to that occurring around Main Bay. Appendix 3-1 lists mammal species commonly occurring in the northwest portion of Prince William Sound. Appendix 3-2 lists species of birds which occur in the North Gulf Coast region including Lake Bay and the land surrounding the Esther Island Hatchery. Invertebrate species are similar to those found in the Main Bay vicinity. Appendix 3-3 lists some of the major species of invertebrates either found or suspected to be present in upper Prince William Sound intertidal areas including those areas adjacent to the Esther Island Hatchery and proposed remote eggtake sites.

No known black bear denning sites are located in immediate vicinity of the hatchery; however, bears occasionally occupy areas in and around the hatchery site especially during salmon adult return. No nuisance black bear have been destroyed at the hatchery site.

Bald eagles, a protected species, are known to occur in and around Esther Island; however, no known nesting sites are located in Lake Bay. The nearest nest is located at the western perimeter of Esther Bay located approximately 3.2 miles east of the hatchery site (J. Bernatowicz, USFWS, pers. comm.).

Fish and wildlife in the vicinity of the remote eggtake and release sites are representative of species found within the Prince William Sound area. Esther Creek contains a barrier to anadromous fish passage.

Interactions Between Wild and Hatchery Stocks:

In recent years, there has been a reduction in the number of wild stocks returning to the Eshamy and Coghill lake systems. For the Eshamy stock, it was suspected that interception by the seine fleet in the Southwestern District may have depleted numbers.

In the Coghill system, excessive numbers of fry, possibly resulting from over escapement, may have depleted their freshwater food resource, thus decreasing survivorship. This would result in fewer smolt leaving the lake system and consequently fewer adults returning two to three years hence.

Currently in Prince William Sound wild and hatchery stocks of sockeye salmon co-exist from the smolt through adult stages. There exists concern that hatchery supplementation may cause both feeding opportunity interactions as well as genetic management difficulties. Current management of the resource follows the guidelines outlined in the Genetic Policy of Alaska (ADF&G 1985). This policy recognizes that wild stocks are an important feature in the Alaskan fishing economy, that hatchery enhancement is directed toward supplementation, rather than replacement of wild stocks, and that genetic diversity helps protect against natural and human-induced changes.

Wild and hatchery reared stocks begin to interact when they enter the marine environment. As both begin the marine portion of their life cycle, they leave the stream or hatchery and generally move into nearshore waters feeding primarily on zooplankton such as copepods (Manzer 1969, Carlson 1974). As they grow, the smolt begin to move into deeper waters and into the influence of the North Pacific Gyre in the Gulf of Alaska (Morrow 1980). Most stocks spend several years in the ocean feeding on amphipods, copepods, and squid (LeBrasseur 1965).

Once entering nearshore waters, both wild and hatchery stocks may begin to compete for the same food resource. Cooney et al. (1981) conducted a feeding behavior and interaction study with hatchery produced pink and chum salmon in Prince William Sound. They concluded, in the nearshore rearing areas where there was a tidal influx of prey species, that food abundance appeared high and little or no resource competition occurred during most of the summer months. They indicated, however, that food limitations were likely to occur for fry entering the marine environment early in the season, February and March, when zooplankton abundances were low. They also demonstrated that pink salmon may capitalize on alternate food as primary resources become scarce.

3.3 HYDROLOGY AND WATER QUALITY

The following descriptions of Main Lake, Main River, and Main Bay are from the Final Environmental Impact Statement for the Main Bay Hatchery prepared by the USDA, Forest Service in 1980.

"The watershed of Main Lake encompasses 6.17 square miles (16.0 square km). The lake has a surface area of 826 acres (334.3 ha), and an average depth of 138 ft. (42.1 m) with the deepest portion being 492 ft. (150.0 m)."

Characteristics of Main Lake are provided in Table 3-2.

TABLE 3-2

Characteristics of Main Lake (Source: U.S Dept. of Agriculture, Forest Service 1980).

Features	Measure
Area	826 acres
Maximum Depth	492 feet
Average Depth	138 feet
Maximum Length	3.29 miles
Maximum Width	0.61 miles
Maximum Volume	113,988 acre-ft.
Elevation above Mean Lower Low Water	214 feet
Direction of Major Axis	North-South
Shoreline Description	Precipitous
Outstanding or Unique Feature	Oligotrophic; precipitous shoreline
Discharge	1 outlet, monthly discharge range of 20 to 200 cfs

"The lake has a precipitous shoreline and is clear and oligotrophic. Main Lake has 55 inlet streams ranging in width from 1.5 ft. (0.5 m) to 12 ft. (3.7 m). The one outlet is Main River."

"Main River is 110 ft. (33.5 m) wide at the lake outlet and the discharge range is approximately 20 to 200 cubic feet per second (ft^3/s) (34.0-339.8 m^3/min)."

Additional information on Main River is provided in Table 3-3.

Ground water at the hatchery site lies about 6 inches (15.2 cm) below the surface. The hatchery does not rely on the ground water for its water source.

"Main Bay soundings show that water depths range from about nine fathoms (16.5 m) to a deep point at 86 fathoms (157.3 m). At the head of the bay, the bottom slopes gently from 0 to 25 ft (0-7.6 m) over about 600 ft (182.9 m) of gravel and cobbles. The bay has a steeper slope at the...dam site and the bottom is covered with mud and natural debris. Near the...barge landing site the bay is about 13.9 ft (4.24 m) deep and the bottom slopes gently. Substrate here is fine gravel. The bay is usually ice-free because of wave action, wind, and water temperatures."

Only a limited amount of data on watershed characteristics of Main Lake have been recorded. Table 3-4 gives hydrological data of the Main Bay area collected at the Main Bay Hatchery from September 1980 through October 1984 (4 years). Also included in this table is available hydrological data adjusted from Whittier rainfall information, between 1950 and 1989. Data from the Whittier station was used since it most closely matched the rainfall patterns experienced at Main Bay. The data presented in Table 3-4 is a model of how Main Lake would have behaved with a 6 to 40 cfs withdrawal. Before 1983, no drawdown occurred on Main Lake. From 1983 to the present, up to 20 cfs has been withdrawn from Main Lake for hatchery operations, and some drawdown has occurred.

In 1977 and 1978, ADF&G collected water samples from Main Lake that were consequently analyzed by Associated Laboratories of Alaska, Inc. and Chemical and Geological Laboratory of Alaska, Inc. respectively. Analyses indicated that the quality of water met or exceeded standards for salmon aquaculture (Forest Service 1980a). Results of these analyses are on record with ADF&G and can be found in the original Main Bay Hatchery FEIS.

Domestic wastewater effluent, approximately 2,150 gallons per day (gpd), is treated in an "Alaskapak" extended aeration packaged sewage treatment plant equipped with a "Sanuril" wastewater chlorinator capable of treating up to 10,000 gpd. Chlorination of the effluent reduces fecal count below 14 FC/ML of effluent (SSOE, Inc. 1992). The wastewater is then piped to a deep water diffuser in Main Bay. Wastewater discharge is controlled under the general wastewater permit (refer to Appendix 2-1).

At the existing Main Bay Hatchery incubation and brood holding effluents, average approximately 14.2 cfs, are discharged directly into Main Bay. There are no significant

TABLE 3-3

Characteristics of Main River (Source: U.S. Dept. of Agriculture, Forest Service 1980)

Feature	English Measure	Metric Measure
Average Width	36 ft	11 m
Length	0.5 miles	0.8 km
Average Depth	1.03 ft	0.31 m
Average Gradient	8 percent	
Velocity	3.73 ft/s	0.11 cm/s
Permanency	Bedrock	
Obstacles	2 major falls, 3 major cataracts	
Spawning Area	11,200 ft^2 (1040.6 m^2) in lower reach only	
Species Present	Pink salmon (390 spawners 8/30/77 and 1,900 on 8/18/78)	
	Sockeye salmon (4 spawners 8/30/77 and 4-10 on 8/18/78)	
Discharge at mouth		
Date 1978	ft^3/s	m^3/s
January 30	25.52	0.7
March 3	27.20	0.8
March 17	38.40	1.1
March 29	40.80	1.2
April 21	34.76	1.0
May 5	77.18	2.2
May 23	83.25	2.4
August 15[a]	39.03	1.1
September 22	70.37	2.0
October 4	94.94	2.7
November 13	26.72	0.8

[a] Discharge taken at Main Lake outlet.

TABLE 3-4
Main Lake
Simulated Water Supply Analysis

Description	Water Year	Date of Maximum Drawdown Storage	Total Annual Runoff 10^8xFt.^{3}	Maximum Stored Precipitation 10^8xFt.^{3}	Maximum Required Storage 10^8xFt.^{3}	Maximum Approximate Ft. of Lake Drawdown
Adjusted Whittier to Main Bay	1950-1951	4-1	15.1	2.6	4.0	11.5
	1951-1952	4-1	16.0	2.4	3.4	9.8
	1952-1953	4-1	27.9	3.5	1.6	4.6
	1955-1956	4-5	19.5	3.1	3.5	10.0
	1956-1957	3-1	15.3	1.6	2.5	7.2
	1957-1958	4-3	24.3	1.7	1.8	5.2
	1959-1960	4-1	19.0	2.5	1.6	4.6
	1961-1962	4-1	16.4	3.6	2.7	7.7
	1962-1963	4-1	20.7	1.2	.4	1.1
	1988-1989	4-5	27.2	--	2.9	8.3
Main Bay	1980-1981	1-1	30.6	--	.40	1.1
	1981-1982	5-1	23.0	--	2.3	6.6
	1982-1983	4-1	24.0	--	0.40	1.1
	1983-1984	1-1 3-1	24.8 26.2	--	0.30 0.30	0.9 0.9
	1984-1985	--	25.5	--	--	--
	1985-1986	--	21.6	--	--	--
	1986-1987	--	32.9	--	--	--
	1987-1988	--	32.9	--	--	--
	1988-1989	--	28.7	--	--	--

quantities, consistent applications of, nor contamination by chemicals to hatchery effluent wastewaters. The following chemicals are used at the hatchery and may enter effluent water: Argentine (iodophor used for equipment and hand disinfection), chlorine bleach (disinfectant), and malachite green (prophylactic fungal treatment for salmon eggs). Hatchery effluent is ultimately piped to the deep water diffuser in Main Bay. Hatchery effluent discharge is also controlled under the general wastewater permit (refer to Appendix 2-1).

Esther Island Hatchery

Esther Lake is approximately 3.7 miles (6.0 km) in length and approximately 0.50 miles (0.8 km) in average width with a one mile (1.6 km) long, narrow, east-west extending arm. The surface area of Esther Lake encompasses approximately 1,363 acres (551.6 ha) and has an average depth of approximately 100 feet (30.1 m) with the deepest portion reaching approximately 459 feet (139.9 m).

Physical characteristics of Esther Lake are provided in Table 3-5.

Esther Lake is limnologically similar to Main Lake. It exhibits low levels of water hardness (<2.5 ppm) requiring low levels of saltwater addition, thus elevating water hardness, to prevent mortality in pre- and post-hatch juvenile salmon.

Hydrological studies showed the Esther Lake drainage capable of delivering in excess of 80 cfs. A water rights permit from the State of Alaska has been obtained for that amount. The estimated mean monthly discharge of Esther Lake ranges between 58.2 and 187.0 cfs. The water requirements of the existing facility varies from 12.8 to 51.8 cfs, which indicates that drawdown is not anticipated during a normal operating year.

Domestic wastewater effluent, approximately 2,500-3,500 gpd, flows through a 5,000 gallon multi-chamber septic tank. The grey-water outfall pipe flows directly to the bay according to the State Wastewater Disposal Permit.

Incubation and brood holding effluents, on average approximately 56.3 cfs, are discharged untreated into Lake Bay. The composition of hatchery wastewater discharges would not exceed those permitted for the Esther Island and Main Bay Hatcheries. Effluent from the upper hillside Esther facility is piped to the deep water diffuser in Lake Bay while the main Esther facility effluent is discharged directly into Lake Bay. There are no records of water quality problems associated with hatchery operations in Lake Bay.

3.4 AIR QUALITY AND NOISE

Main Bay is currently not in an air quality non-attainment area. A non-attainment area is an area that exceeds the National Ambient Air Quality Standards (NAAQS) as determined by the Environmental Protection Agency. As such, the area is within minimal air quality standards.

TABLE 3-5

Characteristics of Esther Lake
(after Anderson Bjornstad Kane Jacobs, Inc. 1984)

Features	Measure
Area	1354 acres
Maximum Depth	459 ft.
Average Depth	100 ft.
Maximum Length	3.69 miles
Maximum Width	0.89 miles
Maximum Volume	135,400 acre-ft.
Elevation above Mean Lower Low Water	111 ft.
Direction of Major Axes	North-South
Shoreline Description	Precipitous
Outstanding or Unique Feature	Oligotrophic; precipitous shoreline
Discharge	1 outlet, monthly discharge range of 58 to 187 cfs

The air and noise quality of Main Bay may occasionally be affected by generalized pollution sources including forest fires, exhaust and noise produced by airplanes and boats, petroleum products used and released by boats, and other similar pollutants.

During normal operation of the hatchery, hydroelectric generation is the primary source of power. Occasionally backup diesel generators, which may affect air and noise quality, are used. Noise may also be caused by bell alarm systems installed to warn against water source failures or other potentially catastrophic situations. Combustible wastes are currently burned on site in an incinerator that meets current regulations.

Air and noise quality at the Esther Island Hatchery is affected by pollution that is regional in scope. Generalized pollution sources would be forest fires, exhaust and noise produced by airplanes and boats, petroleum products used and released by boats, and other similar pollutants. Combustible wastes are burned on site in an incinerator that meets current regulations.

Point sources that may affect air and noise quality at the Esther Island Hatchery include diesel generators and hatchery alarms. At this hatchery diesel generators are the primary source of power and hydro-electric generation is used for supplementation. Noise may also be caused by bell alarm systems installed to warn against water source failures or other potentially catastrophic situations.

During the construction phase of expansion at either hatchery, heavy equipment such as bull dozers, loaders, and cranes would be utilized. These pieces of equipment are powered by diesel motors which produce combustion exhaust and sound intensities of 90-100 decibels (Bond et al. 1963).

3.5 WILDERNESS

<u>Main Bay Hatchery</u>

The Nellie Juan-College Fiord Wilderness Study Area (WSA) was established in the Chugach National Forest by Section 704 of the Alaska National Interest Lands Conservation Act (ANILCA) of 1980. ANILCA directed that this WSA be managed in accordance with the Wilderness Act of 1964, except as otherwise provided for in ANILCA.

The legislative authority governing uses in a WSA and the current status of the Nellie Juan-College Fiord WSA in the wilderness review process, as related to the existing and proposed activities at the Main Bay fish hatchery, are described below.

The Wilderness Act states that wilderness areas "shall be administered for the use and enjoyment of the American people in such a manner as will leave them unimpaired for future use and enjoyment as wilderness." The Wilderness Act prohibits certain uses in wilderness including, "...there shall be no commercial enterprise and no permanent road in any wilderness area..." and further states that "there shall be no temporary road, no use of motor vehicles,

motorized equipment or motorboats, no landing of aircraft, no other form of mechanical transport, and no structure or installation within any such area." (P.L. 88-577).

Direction for the management of the Nellie Juan-College Fiord WSA is provided by the Chugach National Forest Land and Resource Management Plan (USDA, Forest Service 1984 as amended) which states that this WSA will be managed to protect the existing wilderness character of the area and that it will be managed according to the Wilderness Act, 1964 and the wilderness management provisions of ANILCA.

Section 704 of ANILCA requires that the Secretary of the Agriculture conduct a review and make recommendations regarding the suitability or non-suitability of WSAs for the designation as wilderness, in accordance with the provisions in sections 3(c) and 3(d) of the Wilderness Act. Because of the presence of structures and roads, the portion of the Nellie Juan-College Fiord WSA that encompasses the Main Bay Hatchery was recommended as not suitable for wilderness designation by the Forest Service in the Chugach National Forest Land and Resource Management Plan (USDA, Forest Service 1984). Per the provisions of the Wilderness Act, the Forest Service has completed a review of the wilderness suitability for the Nellie Juan-College Fiord WSA. The FEIS and Wilderness Study Report for the Chugach National Forest and the Nellie Juan-College Fiord WSA was prepared in 1985. Until Congress acts on the Wilderness Study Report all areas within the WSA will be managed to maintain the wilderness character.

Through ANILCA, Congress made certain exceptions to the Wilderness Act that apply only to the management of wilderness areas and WSAs in Alaska. Section 1315(b) of ANILCA states,

> "...the Secretary of Agriculture may permit fishery research, management, enhancement, and rehabilitation activities within national forest wilderness and wilderness study areas designated by this Act."
>
> "Any fish hatchery, fishpass or other aquaculture facility authorized for any such area shall be constructed, managed, and operated in a manner that minimizes adverse impacts on the wilderness character of the area. Developments for any such activities shall involve those facilities essential to these operations and shall be constructed in such a rustic manner as to blend into the natural character of the area." (P.L. 96-487)

In addition, Section 1110(a) provides that the Secretary of the Agriculture shall permit on conservation system units (i.e., wilderness, national parks, national recreation areas, and national conservation areas):

> "the use of snowmachines (during periods of adequate snowcover...), motorboats, airplanes, and nonmotorized surface transportation methods for traditional activities (where such activities are permitted by this Act or other law) and for travel to and from villages and homesites. Such use shall be subject to reasonable regulations by the Secretary to protect the natural and other values of the

conservation system units,....and shall not be prohibited unless, after notice and hearing in the vicinity of the affected unit or area, the Secretary finds that such use would be detrimental to the resource values of the unit or area." (P.L. 96-487)

Although ANILCA makes certain exceptions to the Wilderness Act of 1964, ANILCA in Section 707 states "Except as otherwise expressly provided in this Act, wilderness designated by this Act shall be administered in accordance with applicable provisions of the Wilderness Act governing areas designated by that Act as wilderness...". This statement supports the provisions for preserving wilderness character and restricting certain uses in wilderness areas.

The Nellie Juan-College Fiord WSA covers an area of approximately 2,116,000 acres including a portion of the Kenai Peninsula and the islands in the northwestern portion of Prince William Sound. The wilderness values of the portions of this WSA surrounding the project area at the Main Bay alternative are quite characteristic of the islands of Prince William Sound.

The arm between Port Nellie Juan and Prince William Sound, where Main Bay is located, exhibits a high degree of natural integrity. Only the existing fish hatchery facilities, a water pipeline from Main Lake to the Main Bay facilities, and a lighthouse and several cabins at the mouth of Port Nellie Juan provide evidence of humans in the Main Bay area. Though the apparent naturalness of the WSA has been degraded by these intrusions, their influences are localized.

Opportunities for solitude are generally high in the Main Bay area because the area is large, topographic features screen the influences of intrusions to Main Bay, and has few other permanent intrusions. However, commercial fishing tends to concentrate near the existing fish hatchery and the sights and sounds of fishing boats tend to temporarily diminish opportunities for solitude along shoreline areas of the bay and adjacent areas (June-August). Primitive recreation opportunities abound in the project area offering users a high degree of challenge and risk.

The existing Main Bay Hatchery facilities include a structure housing the hatchery and bunkhouse, three residences, a powerhouse, a shop building, a sewage treatment facility, and a small storage building. The hatchery/bunkhouse and residences are colored brown and are constructed from materials that are intended to blend with the colors and textures of the natural landscape. Other modifications to the area include a 30 inch diameter water pipeline, docks, floating net pen complexes, a floating breakwater, and rearing raceways. Though the colors and textures of the hatchery facilities are largely in keeping with the natural landscape, their forms tend to be out of place and inconsistent with the wilderness character of the surrounding area.

Although hydroelectric generation is the primary source of power, fixed-winged planes, motor-powered boats, backup diesel generating units (used approximately 5% of the time), and other motorized equipment also are used for the normal operations at the Main Bay Hatchery facilities. In addition, there are several short sections of gravel road at the hatchery site. ANILCA has made provisions for the use of motorized vehicles in Section 1315(b), which states

"Reasonable access solely for the purposes of this subsection, including temporary use of motorized equipment, shall be permitted...", subject to reasonable regulations and stipulations.

Eggtake and remote release operations associated with the Main Bay Hatchery would either be conducted in the Wilderness Study Area or require fixed-wing or motor vessel transportation through the WSA. Eggtakes would be conducted at Eyak Lake, and in the Coghill and Eshamy systems. Remote releases would occur in the Coghill and Eshamy systems and at potential remote release locations at Kings Bay, Barry Arm, Port Chalmers, and Nelson Bay (Map 3).

<u>Esther Island Hatchery</u>

The lands on which the existing Esther Island hatchery facilities are located, as well as the surrounding lands, are administered by the State of Alaska, Department of Natural Resources. These lands are located in a Special Use Permit Area in a State Marine Park. As such, the Esther Island Hatchery is outside the WSA according to ANILCA 103 (c) "Only those lands within the boundaries of any conservation system unit which are public lands (as such term is defined in this Act) shall be deemed to be included as a portion of such unit...".

Since there will be no Forest Service decision relating to the expansion of the Esther Island Hatchery proper, discussion of this alternative in relation to the WSA will be limited to remote eggtake and release activities associated with the alternative.

Eggtake and remote release operations associated with the Esther Island Hatchery would either be conducted in the Wilderness Study Area or require fixed-wing or motor vessel transportation through the WSA. It is anticipated that eggtakes conducted in the WSA will occur during mid-August in the Coghill system and during early October in the Eshamy system. Remote releases will occur in early spring as soon as the lake ice melts in Coghill and Eshamy lakes as well as the candidate lakes.

3.6 VISUAL

A visual survey was conducted using the guidelines of the Forest Service Visual Management System (USDA, Forest Service 1974) based on data compiled from topographic maps, site photography, aerial overflight, and field reconnaissance. The guidelines are explained in Appendix 3-4. The results of this survey are described below using the Forest Service terms defined in Appendix 3-4.

3.6.1 Visual Character and Variety Class

Main Bay Hatchery

The Main Bay Hatchery is situated at the head of Main Bay on the western coast of Prince William Sound. The landscapes of this area are characteristic of the Kenai visual character type. The area is covered by broken stands of spruce-hemlock forest scattered over steep slopes that rise abruptly from a rocky shoreline around the bay. Background mountain peaks are more densely forested reaching from 1,000-2,000 feet and are often capped with snow and glaciers. The shoreline of Prince William Sound contains diverse visual character with rock cliffs in some areas and the varied textures of sand, gravel, and broken shale on beach areas separated by jagged rock outcrops.

The visual resource inventory of the Chugach National Forest has designated the mountains and head of Main Bay as variety class A, or distinctive, with remainder of the area variety class B (see Appendix 3-4). The outstanding features of form and texture along the rocky shoreline are complemented by the scenic waterforms of Main Lake and Main River. Main River drops rapidly over 200 feet in elevation through a series of highly scenic waterfalls, chutes, and pools from Main Lake, a deep clear freshwater lake, and empties into Main Bay.

Esther Island Hatchery

The Esther Island Hatchery is situated on the eastern shoreline midway into Lake Bay on the southern end of Esther Island in Prince William Sound. Similar to Main Bay, this area is characteristic of the Kenai visual character type. Broken stands of spruce-hemlock forest are interspersed with rock outcrops on the steep slopes that rise abruptly from the jagged rocky shoreline around the bay. The existing hatchery facilities are located on an area of rock fill placed in a cove just below Esther Lake. The landscape surrounding the Esther Island Hatchery contains variety in landforms, waterforms, and vegetation patterns similar to that surrounding Main Bay which is designated by the Forest Service as variety class A.

3.6.2 Visual Sensitivity

Main Bay Hatchery

The visual sensitivity of viewers in Main Bay was inventoried as sensitivity level 2 (see Appendix 3-4). This level of visual sensitivity indicates that fewer than one-fourth of the users of primary use areas (e.g., WSA) and waterbodies have a major concern for scenic values of the landscape around them. Main Bay is occasionally used by recreation boaters, kayakers, and backcountry users that enter the bay for sportfishing or to access shoreline areas. Currently there are 20 set-netters who have Forest Service special use permits for temporary tent camp sites occupied from June through August. The area around Main Lake was inventoried as sensitivity level 3 because it receives very occasional use by hunters, fishermen, and hikers.

Esther Island Hatchery

The visual sensitivity of viewers in Lake Bay near the Esther Island Hatchery is expected to be similar to that described for Main Bay. Specifically, that fewer than one-forth of the users of primary use areas and waterbodies have a major concern for scenic values of the landscape. Similar to Main Bay, recreation users (e.g., boaters, kayakers, fishermen, etc.) occasionally enter Lake Bay for sportfishing or to access shoreline areas, and would be sensitive to the visual intrusions of the existing development. No inventoried sensitivity level exists because the hatchery is outside the National Forest and within State land.

3.6.3 Visibility

Main Bay Hatchery is not visible to middleground or background views from the bay. Though portions of the existing hatchery facilities are visible to foreground views from the bay, structures are largely screened from view by large tree-covered rock outcrop. The existing buildings were required by the Forest Service to be situated so as to be minimally visible from the bay. The building that houses the new hatchery and bunkhouse is visible through a gap that provides access from facilities to the bay. Holding pens and docks are also visible to foreground views. The residences and other structures are visible only from the extreme head of the bay adjacent to the hatchery facilities.

Buildings and other structures at the Esther Island Hatchery are openly visible to foreground views from Lake Bay. The existing facilities tend to dominate views from the bay once viewers reach a point approximately one-quarter mile away from the hatchery. Two parallel water pipelines are quite noticeable where they descend a steep rocky slope from Esther Lake to the hatchery. Holding pens and docks are also visible to foreground views from the bay. The existing hatchery facilities are not visible to middleground or background views from Wells Passage in Prince William Sound.

3.6.4 Visual Quality Objectives (VQO)

The area around the existing hatchery facilities and along the shoreline is managed by the Chugach National Forest with a VQO of Partial Retention. This VQO requires that activities remain visually subordinate to the characteristic landscape. Partial Retention allows changes in the landscape that may be visually evident, but must repeat the form, line, texture, and color of the surrounding landscape.

Because the State of Alaska has no system for the management of visual resources on state lands, there is no VQO for the landscapes around the Esther Island Hatchery. However, it should be noted that the visual conditions around Lake Bay and the existing hatchery facilities are quite similar to those found at Main Bay Hatchery.

3.7 CULTURAL AND HISTORIC RESOURCES

The Alaska Division of Parks, Office of History and Archeology, has no record of known historical or archaeological sites in the vicinity of the Main Bay Hatchery (Mattson 1978, Hanable 1978) (Appendix 3-5). An archaeological literature search and survey were conducted in 1978 (Mattson 1978). Results indicated that no cultural resources were located at the then proposed Main Bay Hatchery site and no archaeological resources were listed as being on or eligible for the National Register for Historic Places (Federal Register 1978b and subsequent additions).

There are no known historical or archeological sites in the vicinity of the Esther Island Hatchery.

3.8 LAND USE, OWNERSHIP, AND MANAGEMENT

3.8.1 Land Use

<u>Main Bay Hatchery Site:</u> The primary land uses at the facility site and adjacent area, within the WSA, are associated with operation of the fish hatchery, commercial fishing for hatchery cost recovery operations, and commercial setnet fisheries operating at shore sites along Main Bay, in fact, the only limited-entry setnet fishery in Prince William Sound is in the Eshamy District which includes Main Bay. The fish hatchery includes a hatchery bunkhouse building, three residences, a powerhouse, a shop building, storage building, and sewage treatment plant. Setnet fishery operations usually consist of a seasonal camp (often with temporary structures) and locations where gillnets for salmon are set from shore. Approximately 30 set gillnet fishery permits are active in the Main Bay area. In addition, recreational boaters frequently pass through the area and may utilize the bay and shore areas for recreational uses, although the high level of commercial fishing activity during fishing periods may lessen the quality of the recreation experience. During periods when fishing activity is low, Main Bay is used by recreation boaters and kayakers.

<u>Esther Island Hatchery Site:</u> Primary land uses at the Esther Island facility site and adjacent area are associated with operation of the fish hatchery, and commercial fishing for hatchery cost recovery operations. The fish hatchery includes a hatchery bunkhouse building, seven residences, a powerhouse, a shop building, storage building, and sewage treatment plant. In addition, the hatchery is located within the state-established Esther Island Marine Park, along a frequently travelled route between Whittier and Valdez. The park includes Lake Bay and Quillian Bay. Recreational boaters and kayakers frequently pass through the area, and may utilize the bay and shore areas for recreational uses, although the high level of commercial fishing activity during fishing periods may lessen the quality of the recreation experience in the immediate vicinity of the hatchery. Commercial recreational facilities have been proposed for the park, and may include a lodge, campground, fuel stop, and hiking trails.

An expanding sport fishery is continuing to develop in the Esther Island area. Access is by both boat from Whittier and by float plane from Cordova and Anchorage. Designated areas of boat anchorage are located in Lake Bay, and around the corner to the east at the mouth of Quillian Bay.

Eshamy Bay: Eshamy Bay is located within the WSA. Land use in Eshamy Bay, a proposed remote release site for Main Bay and Esther Island sockeye salmon smolt, is typical of areas of Prince William Sound that are used for recreation and commercial fishing purposes. Within range of Whittier for motorized boats and sailboats, it is used during the summer for recreational fishing and other activities such as hiking and camping. Commercial fishing occurs during fish openings in the summer, and there are land and water uses and activities associated with fishing, including the limited entry setnet fishery. Chenega Village Corporation owns much of the shoreline of Eshamy Bay.

Coghill: The Coghill Lake area is located within the WSA. Land use in the Coghill area, which is also a proposed remote release site for both hatchery expansion alternatives, is similar to Eshamy Bay, with a mix of recreation and commercial fishing uses occurring. The Forest Service Cabin is connected to a trail system along the river which receives low summer recreational use levels. Because the area is located close to Whittier, the area receives a significant amount of charter boat and tour operator traffic out of Whittier and Valdez.

Nelson Bay (potential remote release site): Land and water use at Nelson Bay is characterized by occasional marine-oriented recreation and boating uses. Because of its proximity to Cordova, use occurs from spring through fall. Access to the uplands is limited by private ownership.

Port Chalmers/Montague Island (potential remote release site): Port Chalmers receives a variety of uses and activities from spring through the fall deer hunting season. Other uses include boating, fishing, and hunting for bear, waterfowl and deer. A Forest Service recreation cabin is also located in the Port Chalmers area. It supports existing commercial pink and chum salmon fisheries offshore, and is recognized as an area where the fishing fleet and tenders anchor between fishing openings.

Kings Bay (potential remote release site): Land and water uses at Kings Bay, located within the WSA, are primarily related to remote recreation activities, its status as a WSA, and boat tours. Uses occur mainly through the summer boating season, and are more frequent towards the head of Port Nellie Juan, compared to in Kings Bay.

Barry Arm (potential remote release site): Barry Arm is intensively used during the summer and early fall seasons for marine related recreation and tourism uses; in the past some mining activities have occurred near the mouth of Barry Arm. The area receives use by sailboats, motorized craft, kayakers, and tour boat operators. A popular Forest Service public use cabin is located at Harrison Lagoon, at the entrance to Barry Arm.

3.8.2 Land Ownership

Main Bay Hatchery Site: This facility is located within the Chugach National Forest, and within the Nellie Juan-College Fiord Wilderness Study Area. The land is administered by the Forest Service, and the hatchery has operated under a Special Use Permit to ADF&G. Figure 3-2 shows land ownership in the vicinity of the facility site.

The tidelands within Main Bay are administered by the State of Alaska. Numerous tidelands leases have been issued by the Department of Natural Resources for setnet fisheries sites, both in the vicinity of the hatchery site, and farther out in Main Bay.

Esther Island Hatchery Site: This facility is located within the boundaries of Chugach National Forest, on state-administered land within the state-established Esther Island Marine Park. The hatchery has operated under a Land Use Permit from the Alaska Department of Natural Resources. The lands on which the hatchery sits and adjacent tidelands are administered by the State of Alaska as part of the land entitlement under the Statehood Act, and have been legislatively designated as a marine park. These lands and tidelands have been closed to mineral entry, settlement, and other uses not compatible with a marine park. Figure 3-3 shows land ownership in the vicinity of the facility site.

Eshamy Bay: Land ownership in the vicinity of Eshamy Bay is predominantly Native Corporation; lands in the area have been selected by the Chenega Village Corporation (Figure 3-4). Some public campsites and boat pullouts are located on easements established under section 17(b) of the Alaska Native Claims Settlement Act. National Forest lands are located to the north of Eshamy Lagoon. Tidelands are administered by the State of Alaska.

Coghill: Lands in the Coghill area are administered by the Forest Service. Tidelands are administered by the State of Alaska (Figure 3-5).

Nelson Bay (potential remote release site): Land in the vicinity of Nelson Bay is predominantly Native Corporation owned; lands in the area have been selected by the Eyak Village Corporation. Tidelands are administered by the State of Alaska.

Port Chalmers/Montague Island (potential remote release site): Uplands in the vicinity of Port Chalmers are administered by the Forest Service, but have been selected by the State of Alaska under its statehood entitlement from the federal government. Tidelands are administered by the State of Alaska.

Kings Bay (potential remote release site): All uplands area administered by the Forest Service, and are within the Nellie Juan-College Fiord Wilderness Study Area of Chugach National Forest. Tidelands are administered by the State of Alaska.

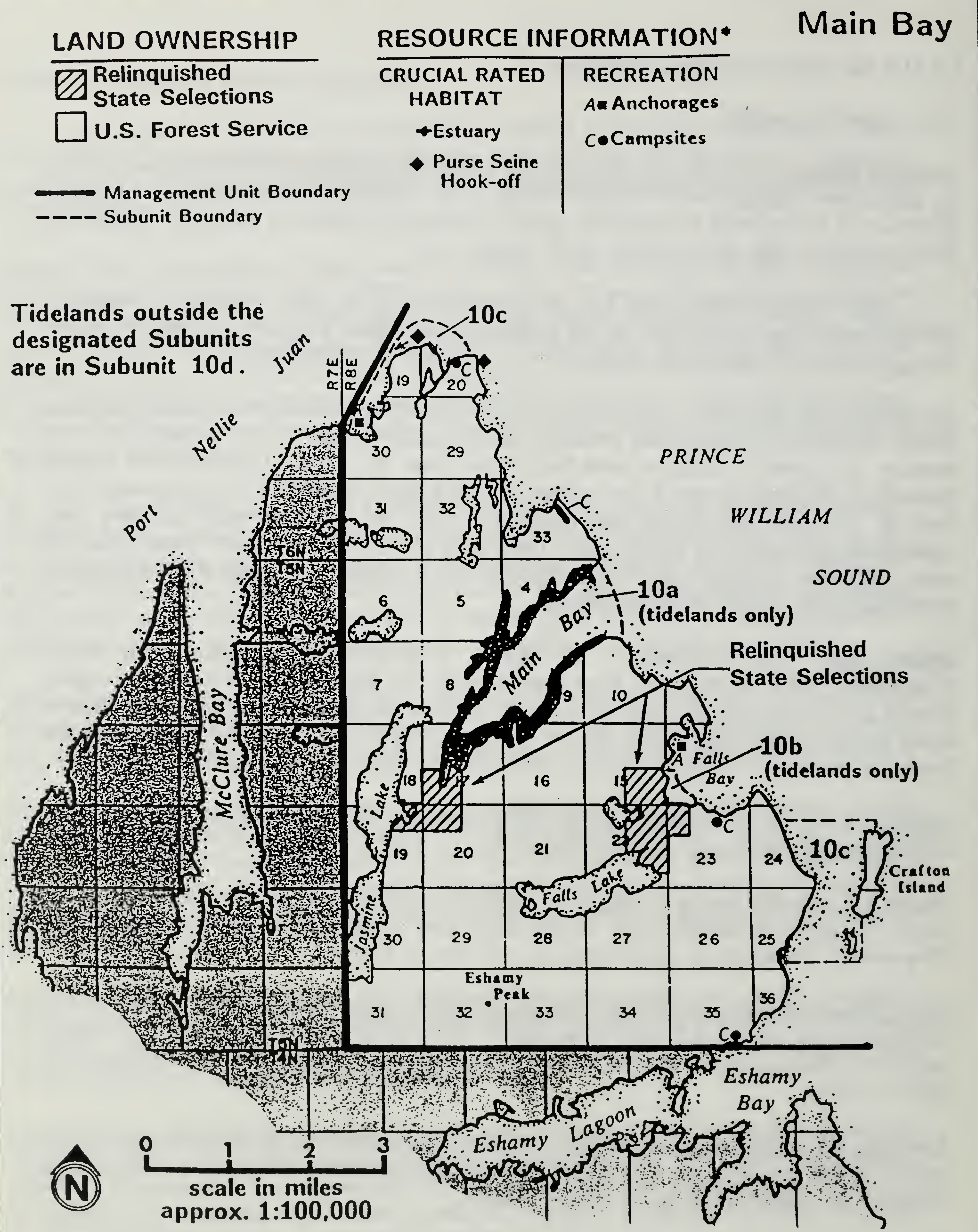


Figure 3-2 MAIN BAY LAND OWNERSHIP

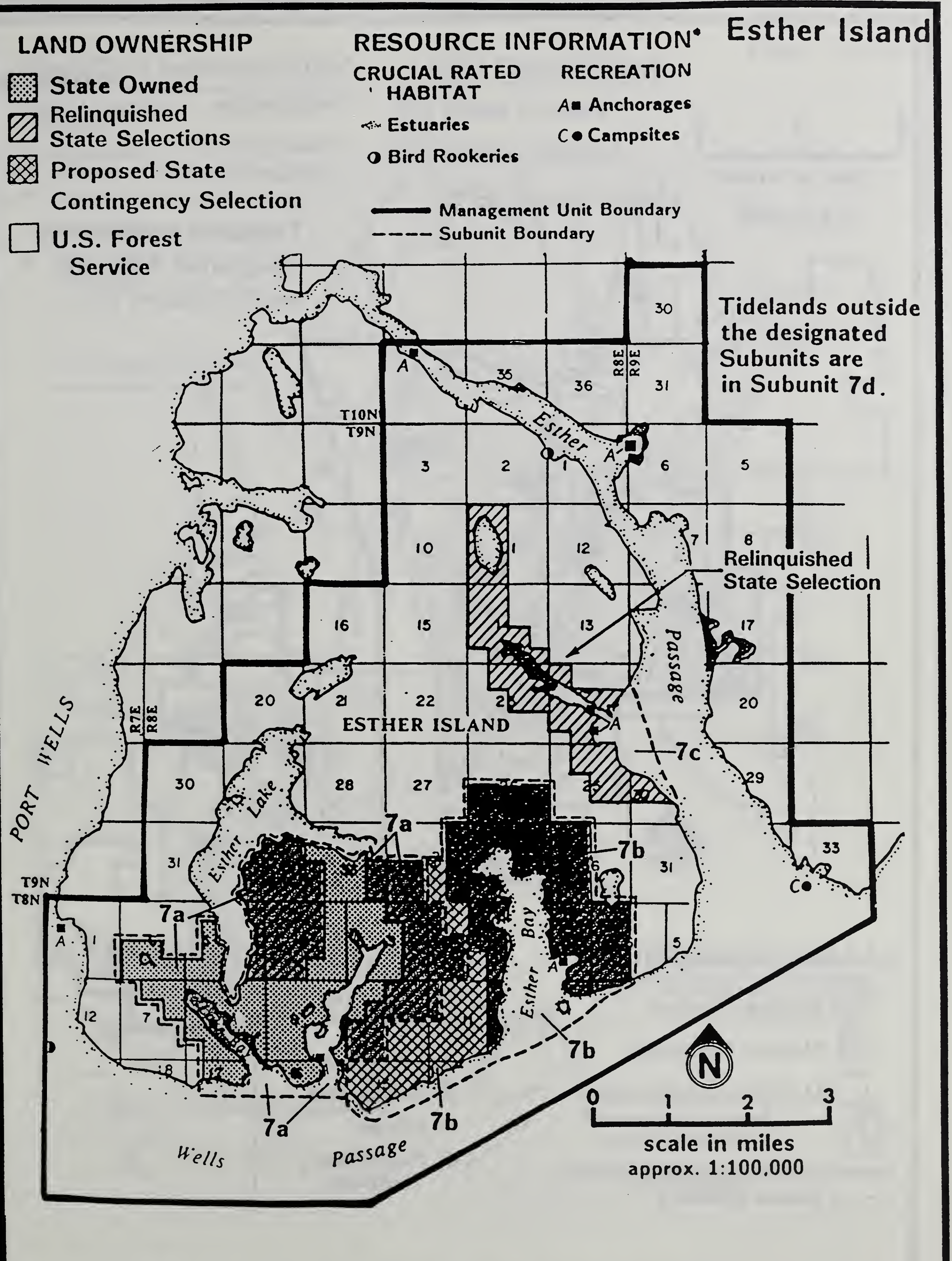


Figure 3-3 ESTHER ISLAND LAND OWNERSHIP

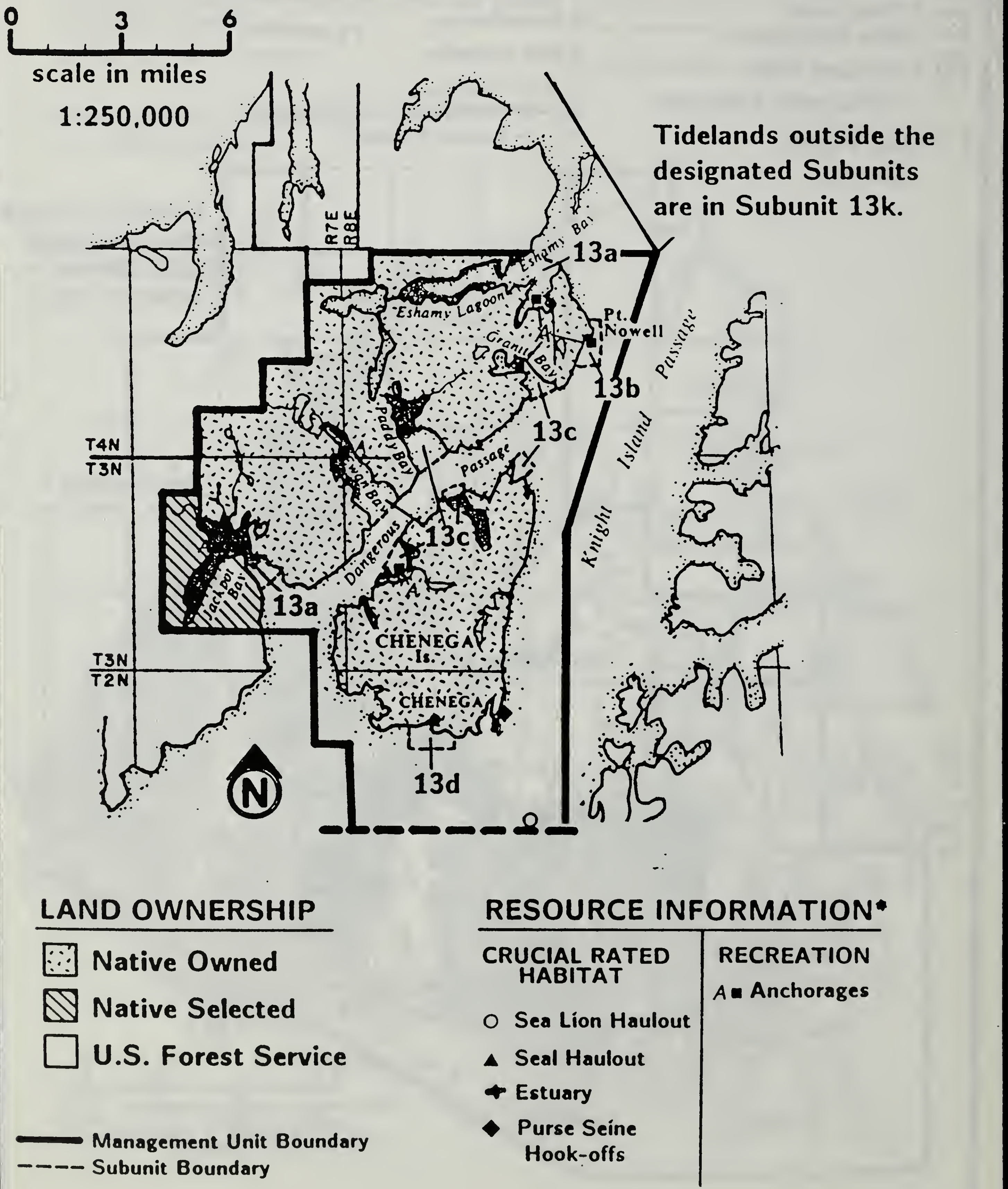


Figure 3-4 ESHAMY BAY LAND OWNERSHIP

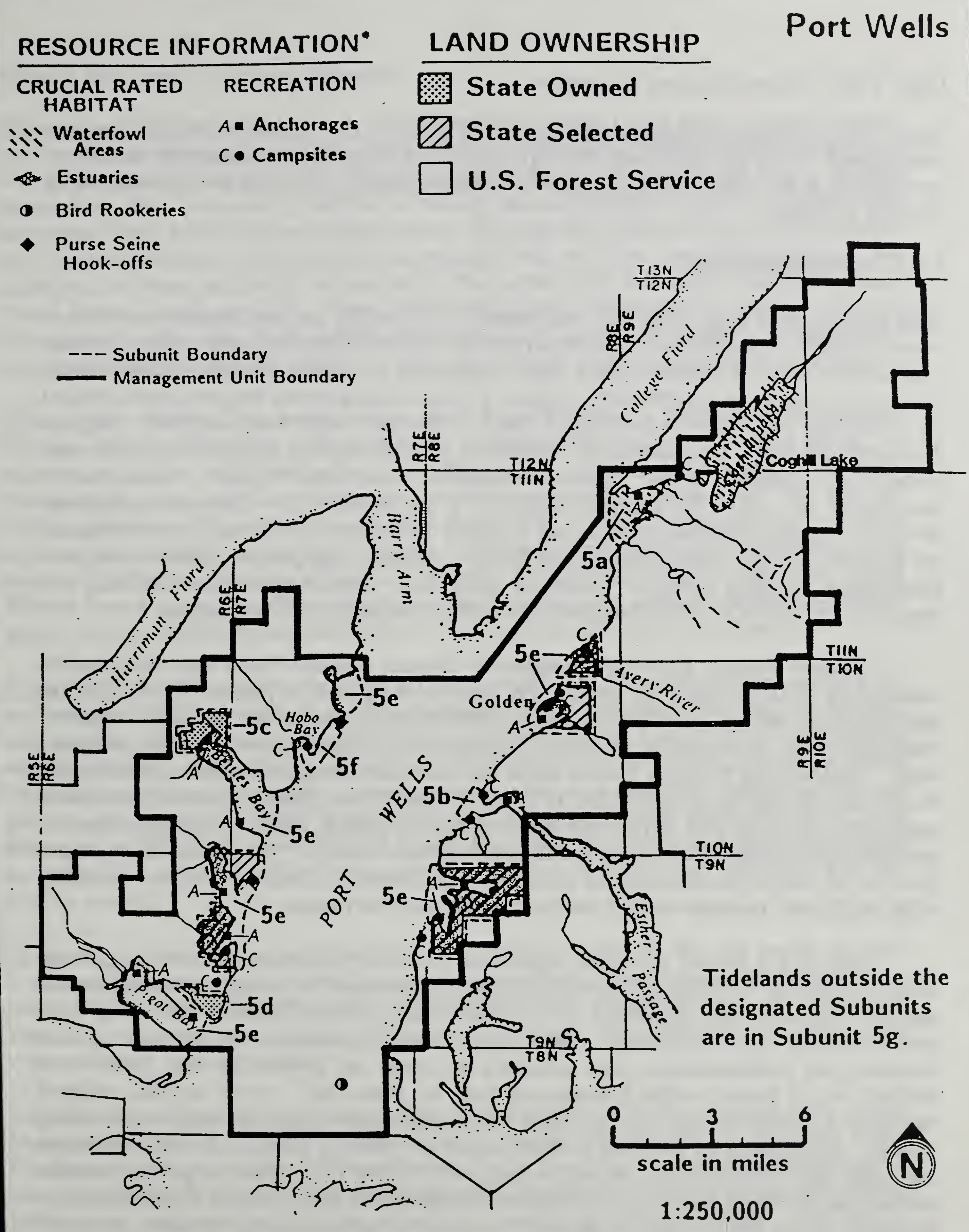


Figure 3-5 COGHILL AREA LAND OWNERSHIP

Barry Arm (potential remote release site): Uplands in the vicinity of Barry Arm are administered by the Forest Service; the upper portion of Barry Arm is included in the area to be evaluated as the Nellie Juan/College Fiord wilderness area. Tidelands are administered by the State of Alaska.

3.8.3 Management Plans

Main Bay Hatchery Site: Land use management of the facility site and adjacent land area is subject to plans and regulations of the Forest Service. The Main Bay is located within the Nellie Juan-College Fiord Wilderness Study Area, designated by Alaska National Interest Lands Conservation Act of 1980 (ANILCA). Subject to valid existing rights, the areas recommended for wilderness and Nellie Juan-College Fiord Wilderness Study Area will,until Congress determines otherwise, be administered to maintain presently existing wilderness character and potential for inclusion in the National Wilderness Preservation System. Concurrently, management will follow the direction established in the ANILCA for wilderness management in Alaska. Under wilderness management guidance in Sections 1315 (a) and (b) of ANILCA, the Secretary of Agriculture may permit fishery research, management, enhancement, and rehabilitation activities within a Wilderness Study Area, including permanent facilities and improvements subject to a fish hatchery (also refer to Section 3.1.5. Wilderness).

Chugach National Forest has completed a Chugach National Forest Plan which guides management of lands within the forest. The intent of the plan is to provide for multiple use management of the recreation, wilderness, wildlife and fish, timber and minerals resources within the forest. It is divided into Level I (geographic), II (management), and III (analysis) areas. The Main Bay facility is located within the Nellie Juan Management Unit (Level II), one of nine such units in the forest and four in Prince William Sound. It includes major boat related recreational activities, part of the State Marine Highway System, major commercial fisheries, important commercial timber areas, and fish and wildlife resources. The primary management goals are to enhance marine oriented recreation opportunities, maintain the roadless character in the study area, maintain wildlife habitat, and increase fish habitat.

Main Bay is located within the marine area covered by the Prince William Sound Area Plan, prepared by the Alaska Department of Natural Resources to manage state-administered uplands, tidelands, and submerged lands within Prince William Sound. The Area Plan determines land use classifications, land disposal locations, administrative designations, land selections and relinquishments, and guidelines for leases and permits on state lands. The hatchery site is located within Management Unit 10, Main Bay. Under the plan, tideland management within the unit will emphasize use of tidelands to support the commercial fishing industry, maintenance of fish and wildlife habitat on which it relies, and public access to campsites and anchorages for recreation and sport fishing use. Float lodges and similar commercial recreation facilities are prohibited throughout this unit; however a floating facility to support the set gillnet fishery is allowed. In Main Bay (subunit A), the tidelands are closed to mineral entry.

Esther Island Hatchery Site: Land use management of the Esther Island facility site and adjacent area is subject to plans and regulations of the Alaska Department of Natural Resources (ADNR). The Esther Island Hatchery Facility is located within the area covered by the Prince William Sound Area Plan, prepared by ADNR to manage state-administered uplands, tidelands, and submerged lands within Prince William Sound. The plan determines land use classifications, land disposal locations, administrative designations, land selections and relinquishments, and guidelines for leases and permits on state lands. The hatchery site is located within Management Unit 7, Esther Island, subunit 7a, Esther Island Marine Park. Under the plan, land and tideland management within the subunit would emphasize use of lands and tidelands to support the existing marine park and fish hatchery. The area is closed to mineral entry and settlement.

Eshamy Bay: Eshamy Bay remote release site is located within the Nellie Juan Management Unit (Level II), one of nine such units in the forest and four in Prince William Sound. It includes major boat related recreational activities, is adjacent to an Alaska Marine Highway System route, major commercial fisheries, important commercial timber areas, and fish and wildlife resources. The primary management goals are to enhance marine-oriented recreation opportunities, maintain the roadless character in the study area, maintain wildlife habitat, and increase fish habitat. Eshamy Bay is located in the Chenega Management Unit of the Prince William Sound Area Plan. State tidelands are to be managed to maintain public sport fishing access, and for wildlife habitat and harvest. The lagoon is closed to mineral entry.

Coghill: The Coghill remote release site is located within the College Fiord Management Unit, and within the WSA boundary. It includes major boat related recreational activities, commercial tour activities, and major commercial fisheries, tour and charter boat activities, and fish and wildlife resources. The primary management goals are to enhance marine oriented recreation opportunities, maintain the roadless character in the study area, maintain wildlife habitat, and increase fish habitat. Coghill Point, River and Lake are located within the Port Wells Management Unit of the Prince William Sound Area Plan. State tidelands are to be managed for public recreation and wildlife habitat, and are closed to floatlodges and subsurface activities such as mining.

Nelson Bay (potential remote release site): The uplands of Nelson Bay are owned by Eyak Corporation and are subject to their management guidelines. State tidelands are subject to the Prince William Sound Area Plan, and are located within the Fidalgo Management Unit of that Plan. State tidelands management guidelines call for general use and dispersed recreation, but with protection of estuary values.

Port Chalmers (potential remote release site): Port Chalmers is located within the Big Islands Management Unit of Chugach National Forest and the subunit 24C of Montague Island Management Unit of the State's Prince William Sound Area Plan. Management guidelines for State uplands and tidelands call for continued public recreation (including access) and wildlife habitat uses, and continued use for support of commercial fishing activities. The area is identified as capable of future settlement and commercial/industrial uses such as support of commercial fishing.

Kings Bay (potential remote release site): Kings Bay is located within the Nellie Juan Wilderness Study Area of Chugach National Forest and the Nellie Juan Management Unit of the Prince William Sound Area Plan. State tidelands management guidelines call for continued public recreation and wildlife habitat use.

Barry Arm (potential remote release site): Barry Arm is located within the College Fiord Management Unit of Chugach National Forest (including the Nelly Juan/College Fiord Wilderness Study Area) and the College Fiord and Port Wells Management Units of the Prince William Sound Area Plan. State tidelands management guidelines call for continued public recreation, wilderness values, and wildlife habitat use, including avoiding disruption of important waterfowl use areas in the estuaries. Tideland facilities and leases will be allowed only if they are mostly underwater or cause limited impact to fish and wildlife, recreation, tourism, and wilderness values.

3.9 SOCIO-ECONOMICS (NON-FISHERIES)

3.9.1 Hatchery Sites

Population

Approximately 10 people, including employees and families, live on-site at the Main Bay Hatchery year around. During June and July, the temporary work force causes the total population to increase to 19 and 21, respectively.

Approximately 10 people, including employees and families, live on-site at the Esther Island fish hatchery year around. During the summer months, the temporary work force ranges from 25 to 39 employees.

Employment

Approximately five people are permanently employed by the existing Main Bay Hatchery operation. During June and July, the temporary work force may increase to 11, bringing total employment during that period up to 16 workers. Total payroll for permanent employees at the Main Bay Hatchery is $183,705. The payroll for temporary employees is $92,324. Employment benefits provided by PWSAC total $80,796.

Nine people are permanently employed by the existing Esther Island fish hatchery operation. During the summer months the temporary work force ranges from 25 to 39 employees, bringing total employment during that period to 34 to 48 workers. Total payroll for permanent employees at the Esther Island Hatchery is $336,817. The payroll for temporary employees is $336,976. Total employment benefits provided by PWSAC is $198,569.

Housing and Infrastructure

Housing at the Main Bay site consists of a hatchery building/bunkhouse facility and three single family residences. The bunkhouse is in the hatchery building and contains five rooms, with a total of 10 bunks. Power is generated by a small, on-site hydroelectric turbine facility, with emergency diesel electric generation equipment. The turbine is capable of handling 8-20 cfs producing 150-200 kw of power. Water supply is provided from a nearby lake by a 30 inch pipeline. Sewage treatment is provided by an on-site treatment system.

Housing at the Esther Island site consists of a bunkhouse facility and seven single family residences. The bunkhouse is in the hatchery building and contains 11 rooms, with a total of 23 bunks; an additional 16 temporary bunks are available for the busy summer season. Power is generated by hydroelectric generation equipment. The hydroelectric turbine is capable of handling 30 to 80 cfs. Diesel power is used occasionally as a backup power source. Water supply is currently provided from Esther Lake, using a two pipe system (36 inch deep intake and 30 inch shallow intake). Sewage treatment is provided by an on-site septic treatment system.

3.9.2 Whittier

Whittier is a small community located at the western end of Passage Canal in the northwest corner of Prince William Sound. Established by the military during World War II as a new port site to the interior of Alaska, Whittier is connected to the rest of southcentral Alaska by a rail link and remains important as a rail cargo and marine highway port. Whittier is the nearest community to the Main Bay Hatchery. Its small boat harbor is the nearest marine embarkation point to the hatchery. As the nearest harbor to Anchorage, Whittier supports a number of small recreational boats. Approximately 90% of the boats are recreational, and 90% are owned by Anchorage residents. Whittier is a center of sport and commercial recreation and tourism activity in the western Prince William Sound, with many recreational boaters and kayakers using it as a point of entry to the Sound. Several charter and tour companies base their boats out of Whittier during the summer months and offer package tours in the Sound and general study area.

In recent years, Whittier has grown as a support center for commercial fishing activities. Several commercial fishing operations are permanently based out of Whittier, and others use the harbor for temporary moorage during fishing seasons, or pick up fuel and other supplies there. Fish processors have located in Whittier during the past years, and fish have been delivered to Whittier for transport to Anchorage for processing. Great Pacific Seafoods is currently operating in Whittier and processes fish produced from the Main Bay Hatchery.

Population: According to the 1990 census, the total population of Whittier was 243. Of that population, 139 were male and 104 were female. Racial characteristics were as follows: 196 white, four black, 11 Asian/Pacific Islander, 15 American Indian, 15 Eskimo, and two other.

Local Economy: The economy revolves around local, state, and federal government employment (Alaska Railroad, State of Alaska Marine Highway System, U.S. Army petroleum

distribution center). Other contributors include the fishing industry, charter boat and rental operations; guiding, tourism and port activities. The majority of freight delivered to PWS hatcheries passes through Whittier.

Employment Characteristics: Local government and service businesses are the predominant employers. In Fiscal year 1989, the city had 20 permanent employees, and the Chugach School District had 11 employees. Approximately four people are employed by the Alaska Railroad, and 11 people are employed by the Air Force tank farm facility. Private employment associated with the port totaled 20 employees in 1989. In the summer of 1989, 12 to 15 tour-charter companies were operating out of Whittier. Fish processing is also a source of summer employment, with Great Pacific Seafoods and Whittier Seafoods operating.

Community Services and Housing: There is community supplied water, electric and sewer services to the community. Community facilities include a school, a museum, and health clinic. There are two hotels, three stores and no financial institutions. In the small boat harbor, marine supplies, charter boats, boat rentals, and tour operators are available. In addition, there are businesses that offer marine engines, and boat and auto repair services. Fishing and hunting licenses are available.

There are two main condominium buildings in Whittier that serve as housing. One is the 14 story Begich Towers with 198 apartments. The other is the Whittier Manor. The Buckner Building, with 1,000 available apartments, is currently under renovation. The Alaska Population Overview, Housing Unit Counts indicates that in April 1, 1990, Whittier had 265 total housing units, with 112 occupied and 153 vacant. This compares with 282 total units in April 1, 1980, with 77 occupied and 205 vacant.

3.9.3 Seward

Seward is a small community located at the northern end of Resurrection Bay on the western end of Prince William Sound, 125 road miles from of Anchorage. Established as a port of entry for travel in to the interior and mining support center in the late 1800s, Seward became the southern terminus of the Alaska railroad in the early 1920s. Like Whittier, its small boat harbor is also a marine access point to the project area, and supports a large number of small recreational boats. Seward is also a center of sport and commercial recreation and tourism activity in the western Prince William Sound, with many recreational boaters and kayakers using it as a point of entry to the Sound. Several charter and tour companies base their boats out of Seward during the summer months and offer package tours.

Seward is a support center for commercial fishing activities. Several commercial fishing vessels are permanently based out of Seward and others use the harbor for temporary moorage during fishing seasons, or pick up fuel and other supplies there. Fish processors have operated out of Seward during the past years. Ward's Cove and Seward Fisheries are currently operating in Seward, and process fish from the Main Bay Hatchery.

Population: According to the 1990 census, the total population of Seward was 2,699. Of the population, 1,587 were male and 1,112 were female. Racial characteristics were as follows: 2,173 white, 69 black, 37 Asian/Pacific Islander, 161 American Indian, 186 Eskimo, 63 Aleut, and 10 other.

Local Economy: The economy is diverse with recreation/tourism, fishing, shore side support of industry (coal, fish, general cargo) among some of the prime businesses. There is a vocational training facility and the University of Alaska's Institute of Marine Science Seward Marine Center is also in Seward.

Employment Characteristics: A pool of skilled, semi/un-skilled workers are available during most of the year. Table 3-6 and Table 3-7 indicate employment estimates for 1989 and 1990 respectively.

Community Services and Housing: The City of Seward supplies water, electricity and sewer services to the community. A contractor, Seward Services, provides garbage services. Telephone services are supplied by General Telephone Company. Community facilities include elementary, junior/senior high school and the aforementioned vocational/technical school. There is a hospital, nursing home, health clinic, and alcohol/mental health community services center. Recreational facilities include a gymnasium, theater, bowling alley, two campgrounds, boat harbor, hunting, fishing, skating, hiking, swimming pool, tennis courts, racquetball court, little league softball fields, teen center, playgrounds, and basketball courts. In addition, there are five hotel/motel facilities, several bed and breakfasts, 14 churches, two financial institutions, a library, museum senior citizen center, and three licensed day care facilities. Alaska Population Overview, Housing Unit Counts indicated that on April 1, 1990, Seward had 1,010 total housing units, with 886 occupied and 124 vacant. This compares with 777 total units in April 1, 1980, with 670 occupied and 107 vacant.

3.9.4 Cordova

Cordova is a small community located on Orca Inlet in the northeast corner of Prince William Sound, approximately 160 miles southeast of Anchorage. Cordova is primarily a fishing community, although until the 1930s, was the terminus for a railroad to the copper mine in Kennicott in the interior of Alaska. It also serves as a point of entry for dispersed recreation in eastern Prince William Sound, primarily for sport hunting (bear, deer, and waterfowl), sport fishing, and wildlife viewing. The small boat harbor at Cordova primarily supports the commercial fishing fleet and recreational boats owned by local residents.

Population: According to the 1990 census, the total population of Cordova was 2,110. Of that population, 1,149 were male and 961 were female. Racial characteristics were as follows: 1,678 white, eight black, 170 Asian/Pacific Islander, 53 American Indian, 22 Eskimo, 162 Aleut, and 17 other.

TABLE 3-6

Seward Subarea 1989 Quarterly Employment

Division	Business Reporting	Employees	Average Payroll ($)	Average Wage ($)	Business Reporting	Employees	Average Payroll ($)	Average Wage ($)
	1st quarter				3rd quarter			
Construction	8	45	179,373	1,339	9	71	611,885	2,859
Manufacturing	4	NA	NA	NA	5	356	2,583,581	2,421
Trans./Comm.Util.	11	77	540,371	2,339	53	389	7,895,681	6,772
Trade, Wholesale	8	66	1,388,632	6,978	8	99	859,715	2,895
Trade, Retail	35	139	446,385	1,070	37	262	1,210,477	1,538
F.I.R.E.	6	17	71,393	1,428	5	20	83,617	1,417
Services	29	173	646,531	1,246	27	NA	NA	NA
Miscellaneous	1	NA	NA	NA	1	NA	NA	NA
Federal	4	39	233,755	1,998	4	53	501,973	3,157
State	13	393	3,646,304	3,095	14	440	4,289,786	3,247
Local	5	194	1,641,191	2,815	4	123	1,099,805	2,981
Total	124	1,367	10,341,303	2,522	167	2,220	21,492,753	3,227
	2nd quarter				4th quarter			
Construction	9	62	276,597	1,487	9	52	345,429	2,229
Manufacturing	4	279	1,963,065	2,343	5	209	1,321,933	2,108
Trans./Comm.Util.	26	296	5,384,916	6,064	34	90	709,543	2,628
Trade, Wholesale	8	85	874,999	3,418	8	55	428,748	2,583
Trade, Retail	34	238	759,240	1,063	36	180	620,751	1,152
F.I.R.E.	5	20	75,895	1,244	5	21	88,079	1,421
Services	29	NA	NA	NA	28	NA	NA	NA
Miscellaneous	1	NA	NA	NA	1	NA	NA	NA
Federal	4	44	325,882	2,450	4	41	313,076	2,525
State	14	415	3,773,672	3,019	14	436	4,078,320	3,116
Local	5	203	1,798,450	2,958	4	166	1,309,760	2,625
Total	139	2,013	17,279,672	2,861	148	1,605	11,423,544	2,372

TABLE 3-7

The Department of Labor Employment Statistics for Seward by Quarter in 1990

Employment Category	1/90	2/90	3/90	4/90
Total	1,477	1,858	2,042	1,635
Mining	0	0	0	0
Construction	41	75	86	50
Manufacturing	163	352	470	261
Transportation	66	113	136	110
Trade	202	305	323	233
Wholesale	51	72	61	52
Retail	151	233	262	181
Finance	20	21	20	19
Services & Misc.	342	352	404	332
Government	643	641	603	629
Federal	43	49	51	41
State	428	415	418	401
Local	172	177	134	187

Local Economy: The economy is predominately fueled by the fishing and fish processing industry. In 1988, 413 commercial entry salmon permits were registered in Cordova, and vessels from the area take part in herring, shrimp, and other Prince William Sound fisheries. Fish processors that have recently been active in community are the Copper River Fisherman's Cooperative (currently Silver Lining), Eyak Packing, North Pacific Processors, St. Elias Ocean Products, and Chugach Fisheries/Moorpac, although the latter are involved in Chugach Native Corporation bankruptcy proceedings. Government services are the major employer, with Federal Aviation Administration, Forest Service, and Alaska Department of Fish and Game offices located in Cordova. The U.S. Coast Guard's cutter Sweetbriar is stationed here. Small scale logging operations are present, and tourism is a growing industry.

Employment Characteristics: The major employer in Cordova is government services. Table 3-8 and Table 3-9 show employment estimates for 1989 and 1990 respectively.

Community Services and Housing: The City of Cordova supplies water and sewer services to the community. A contractor provides garbage services. Electricity is supplied through Cordova Electric Cooperative. Telephone services are provided by Cordova Telephone Cooperative. Community facilities include elementary school, high school and Prince William Sound Community College, Cordova. There is a hospital and nursing home. Recreational facilities include city parks and playgrounds, an outdoor tennis court, softball field and swimming pool. There is a recreation center with year-round activities. Mt. Eyak Ski Area has a single chair lift, two rope tows, food, and ski rentals.

Chugach National Forest offers hiking, hunting, fishing, camping, cabins, bird watching and glacier viewing. In addition, there are four hotel/motel facilities, several bed and breakfasts, 10 churches, two financial institutions, a library, a museum, two video stores, two grocery stores, and numerous restaurants. The Alaska Population Overview, Housing Unit Counts indicates that on April 1, 1990, Cordova had 883 total housing units, with 773 occupied and 110 vacant. This compares with 728 total units in April 1, 1980, with 657 occupied and 71 vacant.

3.9.5 Valdez

Valdez is a community of approximately 4,000 people located in northeastern Prince William Sound at the end of Port Valdez, approximately 115 miles east of Anchorage. Valdez began as a tent city established by prospectors in the late 1890s and, by the early 1900s, Valdez had been established as a port town and transportation route to the interior of Alaska. The Community was incorporated as a city in 1901, with a population between 300 and 400. Between the turn of the century and the 1960s, the growth of Valdez followed cyclical patterns similar to other Alaskan cities, linked to trends in mining, commercial fishing, development of new transportation routs, and major events such as World War II and the Alaskan earthquake of 1964. The earthquake resulted in a major change in the shape of the Valdez, with abandonment of Oldtown and the development of the New Townsite. Construction of the Trans-Alaska Pipeline and Alyeska Marine Terminal in the 1970s accelerated the growth of the community and re-emphasized its role as a regional transportation center. In the 1980s, the

Cordova Subarea 1989 Quarterly Employment

Division	Business Reporting	Employees	Average Payroll ($)	Average Wage ($)	Business Reporting	Employees	Average Payroll ($)	Average Wage ($)
	1st quarter				3rd quarter			
Construction	4	NA	NA	NA	9	38	481,031	4,257
Manufacturing	10	105	679,863	2,165	10	728	5,849,661	2,680
Trans./Comm.Util.	14	61	490,049	2,678	147	336	8,235,938	8,179
Trade, Wholesale	10	NA	NA	NA	10	NA	NA	NA
Trade, Retail	28	114	397,058	1,158	28	160	1,070,174	2,234
F.I.R.E.	5	20	119,828	1,997	5	22	136,664	2,071
Services	22	103	296,458	959	27	133	530,341	1,333
Miscellaneous	5	NA	NA	NA	8	NA	NA	NA
Federal	3	29	224,145	2,606	3	56	317,238	1,900
State	9	80	776,597	3,236	11	142	1,454,832	3,423
Local	3	184	1,217,970	2,210	3	178	1,022,644	1,915
Total	113	NA	NA	NA	261	2,006	21,122,275	3,509
	2nd quarter				4th quarter			
Construction	7	28	296,724	3,532	8	36	290,341	2,713
Manufacturing	10	377	2,377,117	2,100	10	105	860,262	2,740
Trans./Comm.Util.	88	271	4,754,136	5,855	68	119	1,456,627	4,092
Trade, Wholesale	10	NA	NA	NA	10	NA	NA	NA
Trade, Retail	29	159	637,793	1,337	29	117	506,625	1,439
F.I.R.E.	5	23	132,200	1,889	5	29	175,365	1,993
Services	24	141	589,288	1,396	28	101	326,416	1,081
Miscellaneous	8	NA	NA	NA	5	NA	NA	NA
Federal	3	36	275,496	2,575	4	39	317,522	2,714
State	12	113	1,098,452	3,240	11	111	963,689	2,894
Local	3	180	1,636,622	3,025	3	193	1,478,418	2,549
Total	199	NA	NA	NA	181	947	7,262,737	2,556

TABLE 3-9

The Department of Labor Employment Statistics for Cordova by Quarter in 1990

Employment Category	1/90	2/90	3/90	4/90
Total	874	1,450	1,866	1,094
Construction	35	70	63	37
Manufacturing	89	382	757	214
Transportation	84	96	112	90
Trade	125	225	241	169
F.I.R.E.*	23	24	26	24
Services	112	143	139	113
Miscellaneous	78	123	128	73
Government	329	385	401	374
Federal	33	49	65	50
State	97	138	143	107
Local	199	198	193	217

*Financial, Insurance, Real Estate.

economy had expanded to include increased levels of fish processing and tourism. The transportation system has also been expanded, with construction and improvement to the port, small boat harbor, and airport facilities.

Population: The 1990 population was 4,068. Of these, 2,392 were male and 1,676 were female. Racial characteristics were as follows: 3,480 white, 38 black, 128 Asian/Pacific Islander, 239 Eskimo/Aleut, 129 Hispanic, and 54 other. On an annual basis, the population has remained relatively stable, with the exception of 1989, which saw a dramatic increase resulting from activities associated with the Exxon Valdez oil spill. There are pronounced variations in the seasonal population of the community. Construction and fish processing are primarily summer activities, and create temporary increases in both employment and population.

Local Economy: The economy of Valdez is relatively diverse, and includes significant government, commercial/service, commercial fishing and fish processing, tourism/charter boat, port, and industrial/transportation sectors. The importance of commercial fishing/fish processing and tourism/charter boat activities have increased in recent years and both utilize the areas affected by the proposed action and its alternatives. Valdez has two fish processors which operate on the south side of the small boat harbor (Seahawk Seafoods, and Peter Pan Seafoods), and one which operates near the ferry terminal (Nautilus Seafoods). Products are processed primarily during the summer months and include salmon and bottomfish. Up to 206 people were employed in 1988. Approximately 32% of the fish currently produced at Main Bay are processed in Valdez. The industrial/transportation sector is dominated by Alyeska Pipeline Service, whose marine terminal and loading facility is located in Valdez.

Employment: The State of Alaska and the City of Valdez provide the largest sector of employment, accounting for 41% of the total. The transportation sector, dominated by Alyeska Pipeline Service Company, is the next largest, accounting for 26%. Construction has decreased from the early 1980s to 2% in 1988, but has been replaced in importance by manufacturing (fish processing) which increased to 12%. Employment figures are not available for 1989, an abnormal year dominated by oil spill cleanup activities.

Community Service and Housing: The City of Valdez supplies water, solid waste and sewer services to the community. Electricity is provided by Copper Valley Telephone Cooperative. Community facilities include elementary, junior/senior high school, library, convention center. There is a community hospital, Harborview Development Center, health clinic, and alcohol/mental health community service center. Recreational facilities include a gymnasium, theater, bowling alley, two campground, boat harbor, hunting, fishing, skating, hiking, swimming pool, tennis courts, racquetball court, little league softball fields, teen center, and basketball courts. In addition, there are five hotel/motel facilities, numerous bed and breakfast facilities, six churches, two financial institutions, a museum, senior citizen center, and three licensed day care facilities. As of April 1, 1990, 1,499 total housing units existed with 1,277 occupied and 222 vacant. This compares to 1,147 total units in April 1980, with 957 occupied and 190 vacant.

3.10 COMMERCIAL FISHERIES

The commercial fishing industry within Prince William Sound is the primary intended beneficiary for the expansion of the Main Bay hatchery. This section provides baseline information on the existing commercial fisheries taking place near the proposed project and other areas within Prince William Sound and some of the economic factors that are issues of concern for the proposed project.

3.10.1 Biology/Management

Regulatory Structure

Salmon fisheries within Prince William Sound (and other areas of Alaska) are regulated by the Board of Fisheries and managed by ADF&G. The Commissioner of ADF&G has the responsibility for operations and administrations of the divisions within ADF&G. The divisions of concern with respect to the proposed project include: Sport Fisheries Division, Commercial Fisheries Division, Fisheries Rehabilitation and Enhancement Division (FRED), Habitat Division, Subsistence Division, and Division of Boards. All divisions within ADF&G contribute in some way to overall fisheries management.

The Alaska Board of Fisheries develops fisheries policy for ADF&G. The seven member board is appointed by the Governor to promulgate regulations and policy for management of Alaska's fisheries resources.

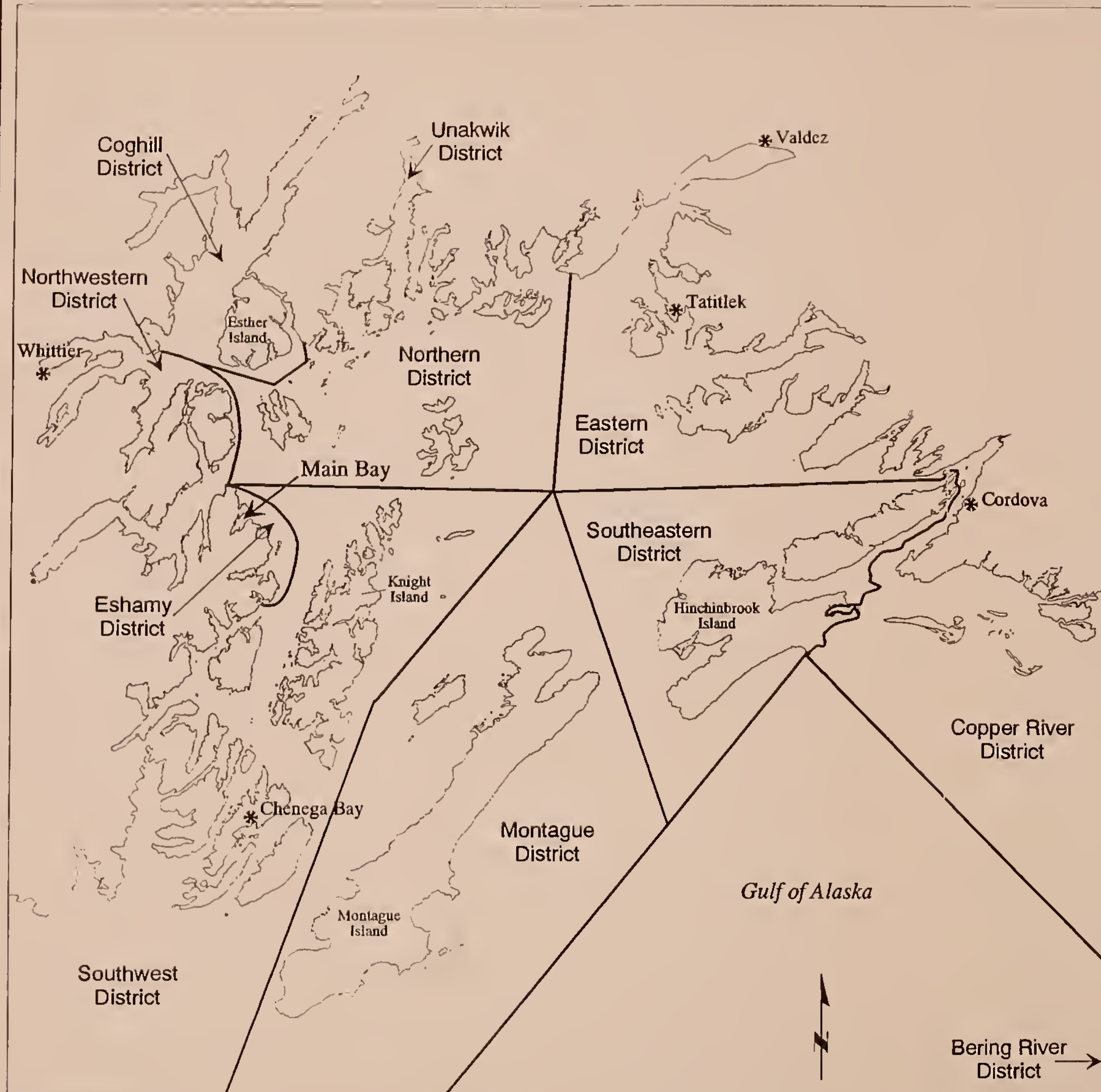
Regulatory Areas: Prince William Sound is managed as one of the four areas within the Region II: South Central. The boundaries of the Prince William Sound area include: all coastal waters and inland drainage entering the north central Gulf of Alaska between Cape Suckling and Cape Fairfield. Within this area, ADF&G designates 11 management districts (Map 4) that correspond to the local geography and distribution of the five species of salmon harvested by the commercial fishery (Brady et al. 1991). Fishing gear is restricted within and between districts by regulation. The districts include:

- Copper River District (drift gillnet only)
- Bering River District (drift gillnet only)
- Coghill/Esther District (both drift gillnet and seine)
- Eshamy/Main Bay District (drift gillnet and set gillnet)
- Unakwik District (drift gillnet and seine)
- Eastern District (seine only)
- Northern District (seine only)
- Southwestern District (seine only)
- Northwestern District (seine only)
- Montague District (seine only)
- Southeastern District (seine only)

Main Bay EIS

Map 4

ADF&G PRINCE WILLIAM SOUND COMMERCIAL FISHERIES MANAGEMENT DISTRICTS



The Coghill/Esther District and the Eshamy/Main Bay District catch sockeye salmon produced at the Main Bay Hatchery. In the Southwestern District there is likely some co-mingling of hatchery and wild stocks; however, this migration occurs prior to interception commercial fisheries openings in this district.

<u>Management Plans:</u> The Main Bay Hatchery is a critical facility for the Prince William Sound Salmon Management and Allocation Plan, which was adopted by the Alaska Board of Fisheries in January, 1991. This plan guides the allocation of fishing times and locations so as to provide an equitable distribution of enhanced salmon among the different gear types. Since as much as 90 percent of the overall commercial salmon harvest from Prince William Sound waters are contributed by enhanced production, this allocation plan is critical to fisheries management in the region.

In 1986, the Main Bay Subdistrict and the Crafton Island Subdistrict were created within the Eshamy District to help manage the fishery close to the Main Bay Hatchery. However, fishing pressure, gear congestion and gear conflicts continued as the two gear types (drift and set gillnets) targeted on the Main Bay Hatchery returns. The Main Bay Alternating Gear Zone (AGZ) was established by the Board of Fisheries in 1989 in response to the growing congestion at the head of Main Bay (Prince William Sound Aquaculture Corporation 1991). The AGZ assists in resolving the congestion by providing alternate days for set gillnet and drift gillnet gear at the head of Main Bay. A brood holding area currently prevents commercial fishing in approximately one-half of the AGZ.

<u>Harvesting Sector</u>

Figure 3-6 shows the commercial salmon harvest in Prince William Sound (PWS) from statehood in 1960 through 1991. The most apparent trend from this figure is the huge growth in pink salmon harvests, beginning in 1979 and increasing rapidly as the hatchery programs grew. Harvests of other species are at a much lower level. In fact, they are difficult to distinguish on this combined graph. Table 3-10 provides a more detailed look at PWS salmon harvests by species. Sockeye salmon is the next most numerous species harvested, followed by chum, coho and chinook salmon in that order.

In 1991, the PWS salmon harvest was over 40 million salmon, the second highest on record (Brady et al. 1991). However, not all of this amount was sold. Due to harvest management problems and processors not buying, 2.7 million pink salmon were discarded at sea, and an additional 1.5 million pink salmon were donated to the former Soviet Union. Total commercial harvests in the common property fishery, by species in 1991 were 26.8 million pink, 1.7 million sockeye, 579 thousand coho, 338 thousand chum salmon, and 35 thousand chinook salmon.

Although pink salmon are by far the largest component of the harvest, sockeye salmon account for the majority of value for the drift gillnet and set gillnet fisheries. Figure 3-7 shows the relative contributions to the total commercial fishery value for the seine, drift gillnet and set gillnet fisheries in 1991. For the seine fishery, pink salmon accounted for 94 percent of total

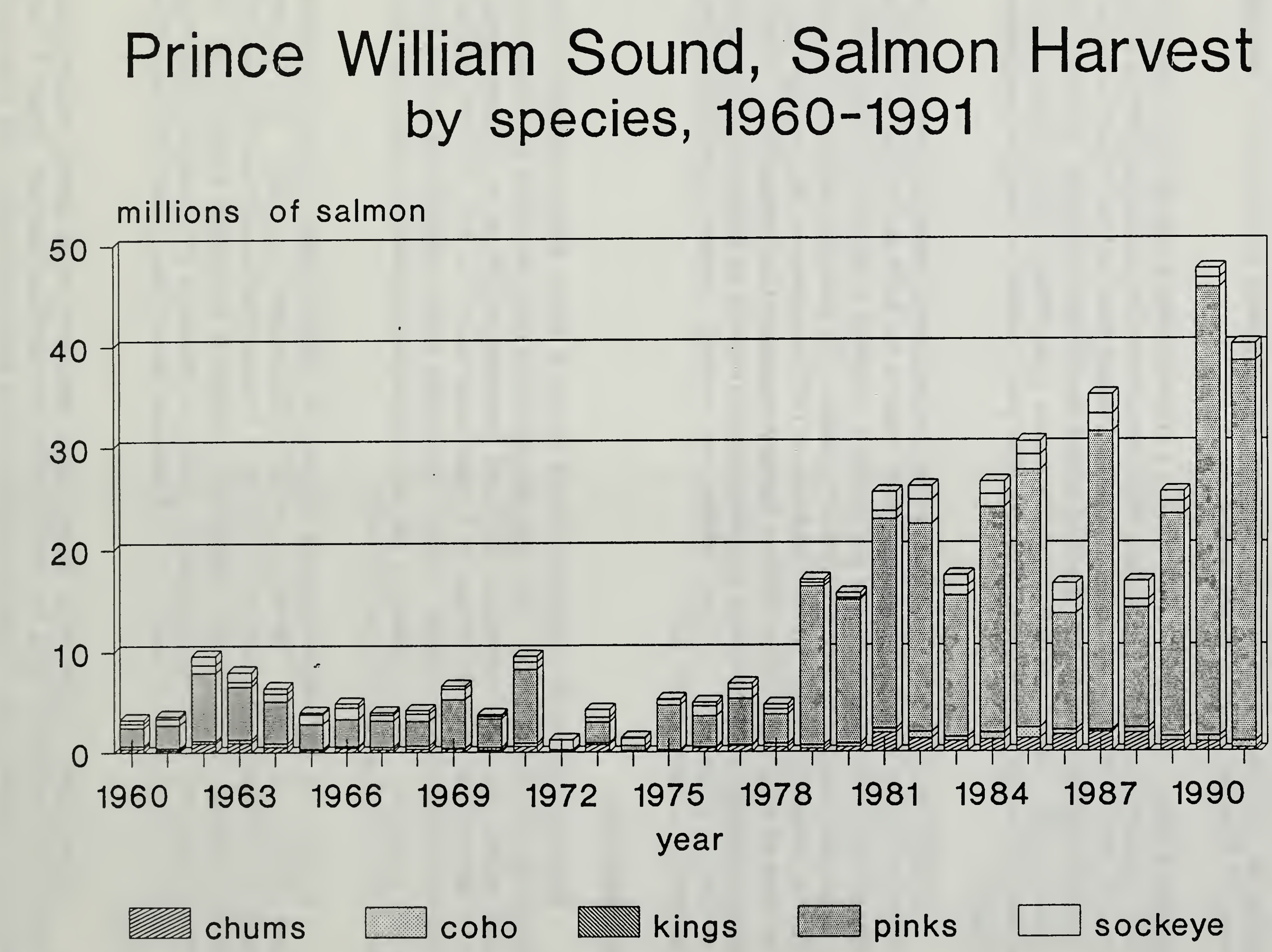


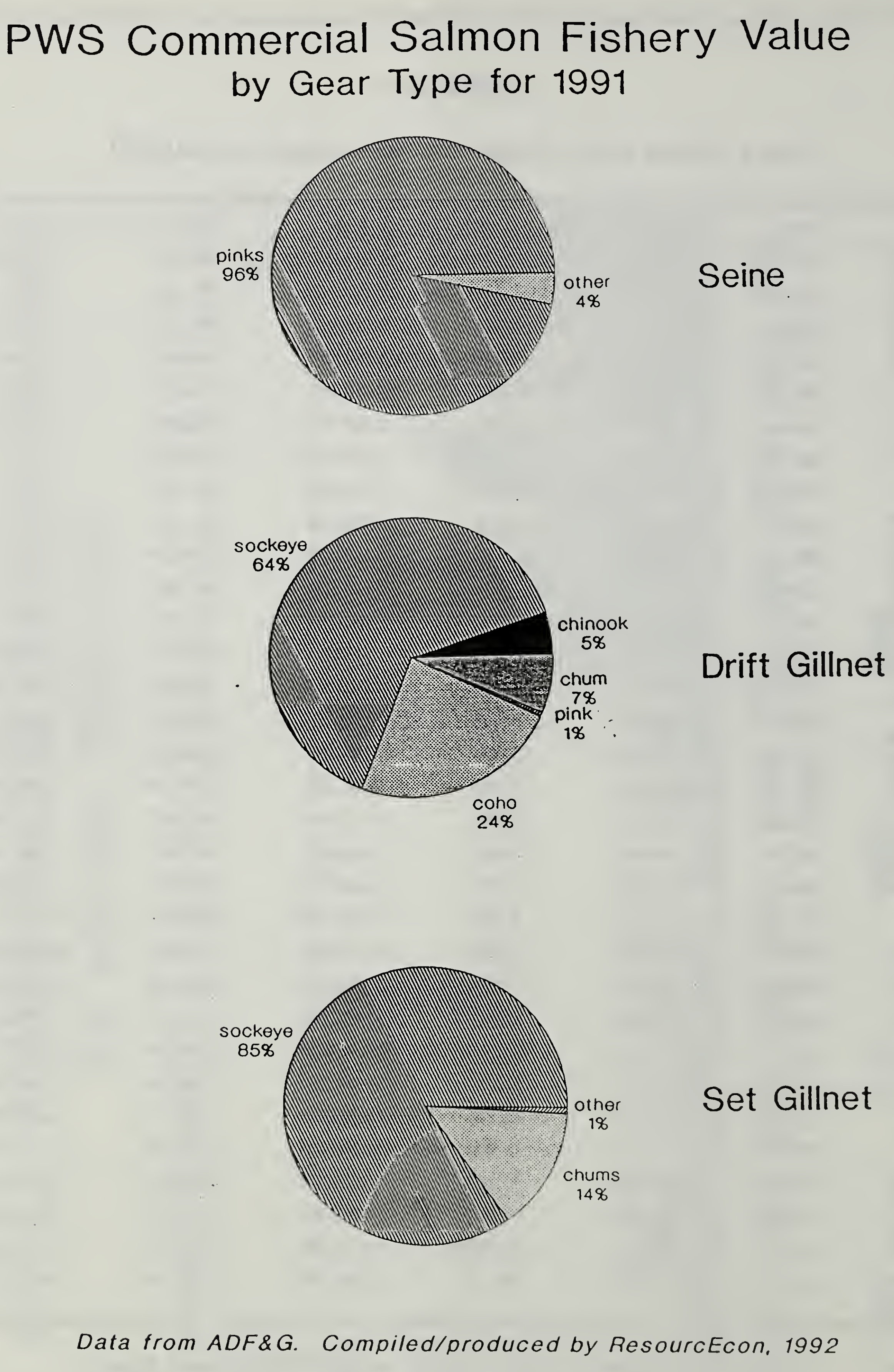
Figure 3-6
data from ADF&G

TABLE 3-10

Prince William Sound, Commercial Salmon Harvest, 1960-1991

Year	Chum	Coho	Chinook	Pink	Sockeye	Total
1960	381,858	238,744	8,899	1,841,896	428,733	2,900,130
1961	224,401	195,858	10,325	2,298,218	656,911	3,385,713
1962	891,880	262,038	16,868	6,742,316	804,324	8,717,426
1963	942,900	339,892	13,259	5,295,378	458,460	7,049,889
1964	539,047	352,343	12,858	4,206,896	779,991	5,891,135
1965	201,043	168,111	16,492	2,460,471	945,020	3,791,137
1966	426,628	189,873	12,108	2,699,418	1,130,278	4,458,305
1967	274,234	247,239	13,497	2,626,340	565,709	3,727,019
1968	342,939	309,694	11,276	2,452,168	721,744	3,837,821
1969	320,977	94,304	17,424	4,828,579	1,020,513	6,281,797
1970	230,661	252,641	20,432	2,809,996	243,403	3,557,133
1971	579,552	327,697	20,142	7,312,730	741,945	8,982,066
1972	46,088	124,670	23,003	57,090	976,115	1,226,966
1973	740,017	199,019	22,638	1,065,844	473,044	3,500,562
1974	89,210	76,041	20,602	458,619	741,340	1,385,812
1975	101,286	84,109	22,325	4,453,041	546,634	5,207,395
1976	370,657	160,494	32,751	3,022,426	1,008,912	4,595,240
1977	573,166	179,417	22,864	4,536,459	943,943	6,255,849
1978	489,771	312,930	30,435	2,917,499	505,509	4,256,144
1979	349,615	315,774	20,078	15,615,810	369,583	16,670,860
1980	482,214	337,123	8,643	14,161,023	208,724	15,197,727
1981	1,888,822	396,163	20,782	20,558,304	784,469	23,648,540
1982	1,336,878	623,877	47,871	20,403,423	2,362,328	24,774,377
1983	1,048,737	365,469	53,879	13,977,116	908,469	16,353,670
1984	1,229,185	609,484	39,774	22,119,309	1,304,515	25,301,267
1985	1,321,538	1,025,046	43,735	25,252,924	1,464,563	29,107,806
1986	1,700,906	426,240	42,128	11,410,302	1,288,712	14,868,288
1987	1,919,415	175,214	41,909	29,230,303	1,737,989	33,104,830
1988	1,843,317	477,816	31,797	11,820,121	767,674	14,940,725
1989	1,001,809	424,980	32,006	21,886,466	1,175,238	24,520,499
1990	967,384	523,814	22,163	44,165,077	911,607	46,590,045
1991	352,222	632,372	35,449	37,295,379	1,735,076	40,050,498

Source: Alaska Department of Fish & Game, Annual Management Reports.



PRINCE WILLIAM SOUND SALMON HARVEST VALUE BY SPECIES

Figure 3-7

value. Pink salmon contributed only one percent of total value to the drift gillnet harvest while sockeye salmon accounted for 64 percent. In the set gillnet fishery, sockeye salmon contributed 85 percent of total value.

Tables 3-11, 3-12 and 3-13 show fishery harvest rates, numbers of permits fished; and total and average gross earnings for seine, drift gillnet, and set gillnet gear, respectively. Since limited entry was implemented in 1975, the total number of permits has been relatively fixed. However, there are minor fluctuations in the number of permits fished from year to year.

Average gross revenues for the seine fishery have tended to vary widely during the period 1977 through 1991. The peak years were 1987 and 1988. In 1991, the average gross revenue per seine permit was $33,270, the lowest it has been since 1978. This was due to extremely low pink salmon prices.

The average gross revenue for the drift gillnet fishery for the period from 1977 through 1991 was much more consistent than the seine fishery. The peak average gross revenue per permit was $67,918, but this figure has been declining since 1991.

The set gillnet fishery has shown the most radical fluctuation in participation in the fishery and in harvest and value. Effort in the set gillnet fishery has been sporadic, particularly in early years. From statehood through 1991, the Eshamy district was closed to set gillnet fishing 12 of the 32 years (Prince William Sound Aquaculture Corporation 1991). In the earlier years of the fishery, set gillnets were commonly held by individuals along with other limited entry permits. In 1975, 22 of the 26 setnet permit holders held other salmon fishing gear permits as well (Prince William Sound Aquaculture Corporation 1991).

This situation has changed in recent years with increasing numbers of enhanced salmon returns through the area and high average revenues in the fishery. In 1989, 28 of 30 permits were held by individuals who did not have other limited entry permits.

The harvests by gear type and species of salmon for the years 1982 through 1991 are shown in Tables 3-14, 3-15, and 3-16. These data are useful in setting the baseline conditions to assess the impact of the proposed alternatives against the status quo in recent years. These tables readily indicate the majority of sockeye salmon are taken in by drift gillnet fishermen.

<u>Production:</u> The sockeye salmon returning to Main Bay consist entirely of hatchery produced stock. The hatchery, which has recently switched its production entirely to sockeye salmon, produced a total of 467 thousand salmon in 1991. Of this, 422 thousand sockeye salmon were harvested by commercial fishermen and the remainder was used by the hatchery for cost recovery and brood stock.

TABLE 3-11

Prince William Sound Salmon Seine Fishery

Year	Harvest (lbs of salmon)	Number of Permits Fished	Total Gross Earnings ($)	Average Gross Earnings ($)
1977	23,129,711	232	9,303,646	40,102
1978	13,091,348	268	5,032,899	24,793
1979	58,159,159	244	26,799,746	109,835
1980	49,543,866	239	20,094,780	84,079
1981	97,499,374	268	44,788,727	167,122
1982	46,965,493	258	19,044,219	73,815
1983	48,683,371	266	12,097,476	45,479
1984	80,118,335	268	21,887,133	83,539
1985	91,479,611	265	23,132,557	87,293
1986	44,289,993	255	11,675,332	47,078
1987	101,081,658	257	45,367,866	176,529
1988	37,196,570	255	34,067,759	133,599
1989	51,960,831	241	21,280,357	88,300
1990	101,576,945	265	34,593,536	130,542
1991*	66,962,101	253	8,279,647	33,726

Note: * 1991 data is preliminary.

Source: Data from the Alaska Commercial Fisheries Entry Commission, unpublished computer reports for years 1977-1990. ADF&G preliminary reports for 1991 harvests and values.

TABLE 3-12

Prince William Sound Salmon Drift Gillnet Fishery

Year	Harvest (lbs of salmon)	Number of Permits Fished	Total Gross Earnings ($)	Average Gross Earnings ($)
1977	12,056,733	393	10,277,264	20,637
1978	8,466,430	519	8,909,837	17,334
1979	7,376,906	506	7,950,772	15,713
1980	6,117,848	393	4,818,321	12,260
1981	12,602,749	479	11,469,278	23,944
1982	26,304,915	524	22,388,631	42,726
1983	14,078,340	528	9,746,248	18,459
1984	22,656,406	522	18,055,881	34,590
1985	23,641,831	533	24,051,015	45,124
1986	14,657,289	485	17,181,009	32,726
1987	18,447,040	519	27,105,379	52,226
1988	20,837,536	525	35,656,914	67,918
1989	15,473,214	485	23,382,352	48,211
1990	21,649,678	528	23,105,657	44,349
1991*	18,165,781	519	13,894,753	26,772

Note: * 1991 data is preliminary.

Source: Data from the Alaska Commercial Fisheries Entry Commission, unpublished computer reports for years 1977-1990. ADF&G preliminary reports for 1991 harvests and values.

TABLE 3-13

Prince William Sound Salmon Set Gillnet Fishery

Year	Harvest (lbs of salmon)	Number of Permits Fished	Total Gross Earnings ($)	Average Gross Earnings ($)
1977	260,986	17	147,679	10,549
1978	NA	2	NA	NA
1979	74,083	7	88,898	12,700
1980	69,889	11	54,760	4,978
1981	NA	3	NA	NA
1982	40,908	5	23,195	4,639
1983	602,639	17	150,309	8,842
1984	1,176,733	19	430,643	22,665
1985	158,786	20	71,439	3,572
1986	198,323	17	51,502	3,030
1987	769,346	21	383,087	18,242
1988	1,613,804	28	1,835,812	65,565
1989	NA	2	NA	NA
1990	2,218,018	28	1,217,979	41,999
1991*	1,623,360	29	1,268,228	43,732

Note: * 1991 data is preliminary.

Source: Data from the Alaska Commercial Fisheries Entry Commission, unpublished computer reports for years 1977-1990. Alaska Department of Fish & Game preliminary reports for 1991 harvests and value.

TABLE 3-14

Prince William Sound Purse Seine Salmon Harvests
by species, 1982-1991
(units in numbers of fish harvested)

Year	King	Sockeye	Coho	Pink	Chum	Total
1982	104	58,719	24,116	17,762,931	946,623	18,762,493
1983	439	38,542	9,706	12,711,549	789,808	13,550,044
1984	80	151,740	11,477	20,222,330	905,376	21,291,003
1986	694	125,041	16,441	23,343,341	1,025,555	24,511,072
1986	513	61,905	11,320	10,233,707	1,403,350	11,710,795
1987	429	111,675	25,044	24,351,353	1,463,787	25,952,288
1986	326	23,394	27,124	7,785,374	1,143,059	8,979,277
1989	679	9,851	69,428	13,125,073	667,563	13,872,594
1990	115	22,213	39,997	32,964,133	272,518	33,348,976
1991	156	18,704	13,339	26,585,034	32,071	26,649,304
10 year average:						
	354	62,178	29,799	18,908,483	864,971	19,862,785

Source: Alaska Department of Fish & Game, 1977, 1990 and 1991 Annual Management Reports.

TABLE 3-15

Prince William Sound Drift Gillnet Salmon Harvests
by species, 1982-1991
(units in numbers of fish harvested)

Year	King	Sockeye	Coho	Pink	Chum	Total
1982	47,744	2,286,311	599,753	189,461	254,185	3,377,354
1983	50,976	864,695	352,933	405,515	245,707	1,919,826
1984	39,690	1,128,528	597,909	1,205,067	314,797	3,285,991
1985	42,955	1,325,188	1,008,419	507,896	267,413	3,151,871
1986	41,420	1,207,174	412,580	74,829	239,356	1,975,359
1982	41,391	1,581,698	140,863	752,682	342,061	2,858,695
1988	31,370	725,853	444,208	1,666,013	565,155	3,432,599
1989	31,388	1,162,674	302,170	696,226	200,835	2,393,293
1990	21,955	878,312	419,055	2,084,456	573,550	3,977,328
1991	35,027	1,530,596	574,879	289,566	256,939	2,687,007
10 year average:						
	3,656	120,866	46,217	74,969	31,048	276,755

Source: Alaska Department of Fish & Game, 1977, 1990 and 1991 Annual Management Reports.

TABLE 3-16

Prince William Sound Set Gillnet Salmon Harvests
by species, 1982-1991
(units in numbers of fish harvested)

Year	King	Sockeye	Coho	Pink	Chum	Total
1982	0	0	0	0	0	0
1983	1	924	8	162,541	3,427	13,550,044
1984	7	23,490	282	247,326	15,451	21,291,003
1985	1	667	0	24,899	1,021	24,511,072
1986	0	4	1	938	65	11,710,795
1987	7	642	8	3,225	7,060	25,952,288
1988	94	50,868	794	34,873	206,060	8,979,277
1989	0	0	0	0	0	0
1990	110	12,967	574	165,362	264,772	33,348,976
1991	76	184,028	574	20,075	49,394	254,077
10 year average:						
	29	27,359	217	65,924	54,725	13,959,753

Source: Alaska Department of Fish & Game, 1977, 1990 and 1991 Annual Management Reports.

The Esther Island Hatchery (WNH I and WNH II) currently produces pink, early chum, chinook, and coho salmon. No sockeye salmon are reared or produced at this facility, although sockeyes were produced between 1987 and 1989. The 1991 returns were 12.1 million pink salmon, 212 thousand chum salmon, 89 thousand coho salmon. This hatchery also produces a small number of king salmon.

<u>Processing Sector:</u> Processing for the Prince William Sound salmon harvest is conducted in several modes:

1) in five major shore plants located in communities within Prince William Sound,

2) in small processing companies located within Prince William Sound,

3) tendered out of PWS and processed by large and small processing companies in other areas, and

4) by floating processors operating in Prince William Sound.

The main processing centers within Prince William Sound are in Cordova and Valdez. There are six processing plants in Cordova:

Chugach Alaska Orca Plant (currently non-operational)
Chugach Fisheries/Morepac (currently non-operational)
Silver Lining/Cordova (formerly Copper River Fishermen's Cooperative)
Eyak Packing
St. Elias Ocean Products
North Pacific Processors

The two plants owned by Chugach Alaska are currently not being operated. There are currently negotiations underway to sell these plants and possibly re-open them by 1993.

There are three main plants in Valdez:

Sea Hawk Seafoods
Peter Pan
Nautilus Marine

In Seward, Ward's Cove and Seward Fisheries are the only active shore based facilities. Other fish buyers and small processors may operate out of Seward. There are several small processing and buying operations located in Whittier.

Other destinations for salmon from Prince William Sound are plants in Homer, Kenai, Seldovia and Anchorage. For the 1990 season, ADF&G listed 18 processors and/or buyers who purchased salmon from PWS (Brady et al. 1991).

Figure 3-8 shows the port of landing for all salmon harvested in Prince William Sound in 1991. Of the total salmon landed for processing, 33 percent was landed in Cordova and 32 percent was landed in Valdez. Seward and Whittier accounted for 13 percent. Cook Inlet plants located in Seldovia, Homer and Kenai received seven percent of the total harvest. Anchorage plants got five percent of the PWS harvest. Floating processors processed five percent, with another five percent going to plants in other areas of Alaska. Table 3-17 provides additional information on processing for 1991.

The distribution of Prince William Sound salmon differs every year. In 1992, factory trawlers processed part of the harvest. With two of the Cordova plants not operating, fishermen are seeking additional markets from processors new to the area. There is also a possibility that the State may invite one or more foreign processing ships into Prince William Sound to supplement the processing capability of domestic companies. Under provision of the Magnuson Conservation and Management Act of 1976, the Governor of Alaska can invite foreign processors to operate in internal waters if insufficient domestic processing capability exists. A report was completed by the State outlining contingency plans if additional processing is needed (Alaska Department of Commerce and Economic Development 1992). Currently the State of Alaska has decided to proceed, and a joint venture between Oceantrawl, Inc.

3.10.2 Economics

Supply: In 1991, sockeye salmon production in Prince William Sound was 1.7 million fish. This represents approximately four percent of the total Alaskan production of sockeye salmon. Figure 3-9 shows the 1991 sockeye salmon harvest from the different management areas. Bristol Bay was the major producing area, with 56 percent of total landings. Total Alaskan production in 1991 was 45.5 million sockeye salmon (ADF&G 1992).

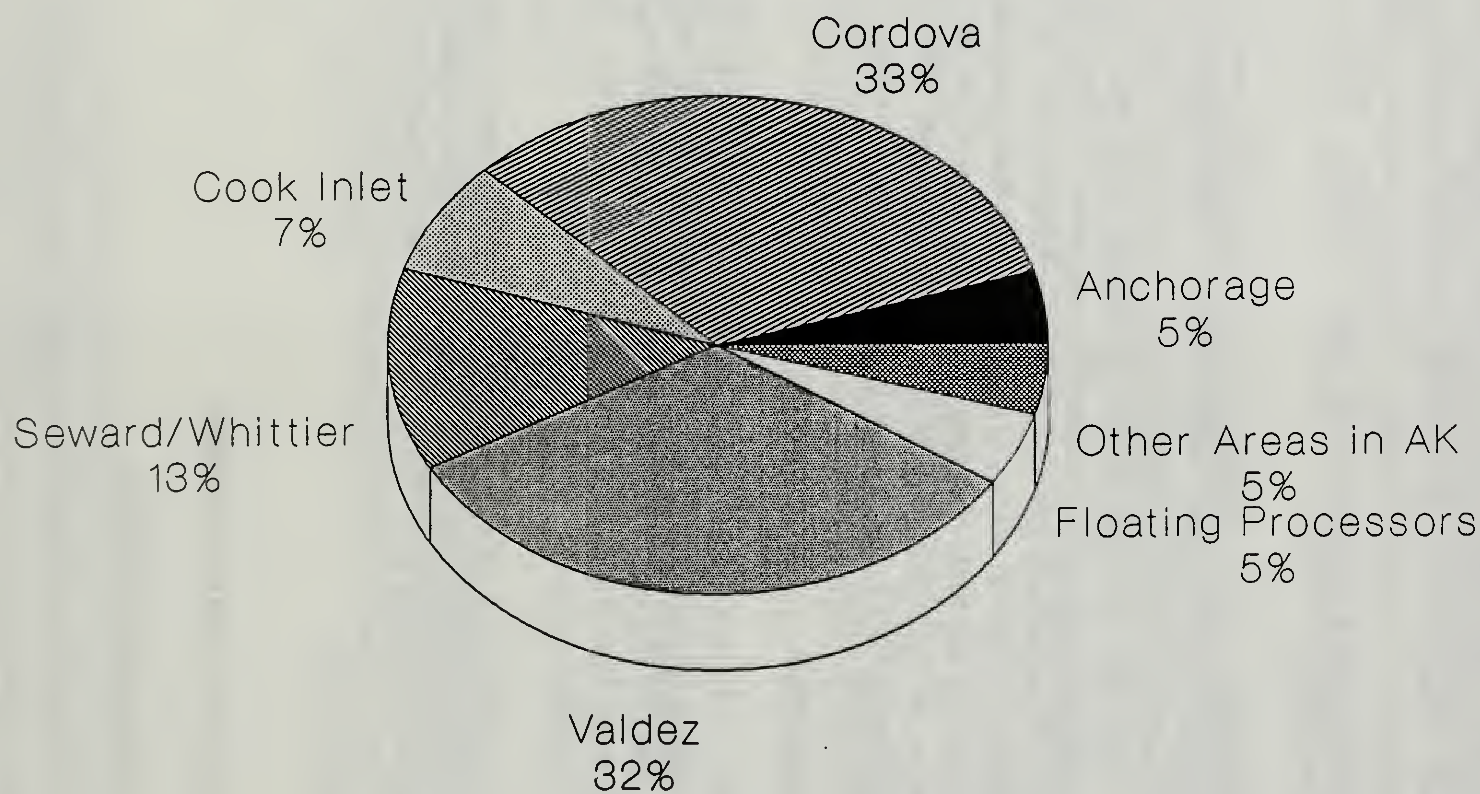
Price: Table 3-18 shows the ex-vessel prices paid to fishermen in Prince William Sound, by species, for the years 1981 through 1991. During this period, salmon prices exhibited a wide fluctuation in price. The peak price for sockeye salmon occurred in 1988 with a price of $2.68 per pound. In 1991, this price had declined to $1.00 per pound; however, some price increase has occurred during 1992.

3.11 RECREATION AND TOURISM

3.11.1 Recreational Fisheries

Table 3-19 shows the sports fish catch in 1990 for Prince William Sound and selected effort areas in the vicinity of the proposed alternatives. These figures are gathered by ADF&G, Division of Sports Fish, and include both harvest and catch and release, in saltwater and fresh water. The first year that sport fishing effort and catch were broken out for the Prince William Sound harvest was in 1990. Three locations of fishing effort fall within the Main Bay alternative locations: Knight Island Passage (saltwater); Eshamy Creek and Lagoon (freshwater); and

PWS Salmon Landings by Port for 1991



ResourcEcon, 1992

Figure 3-8

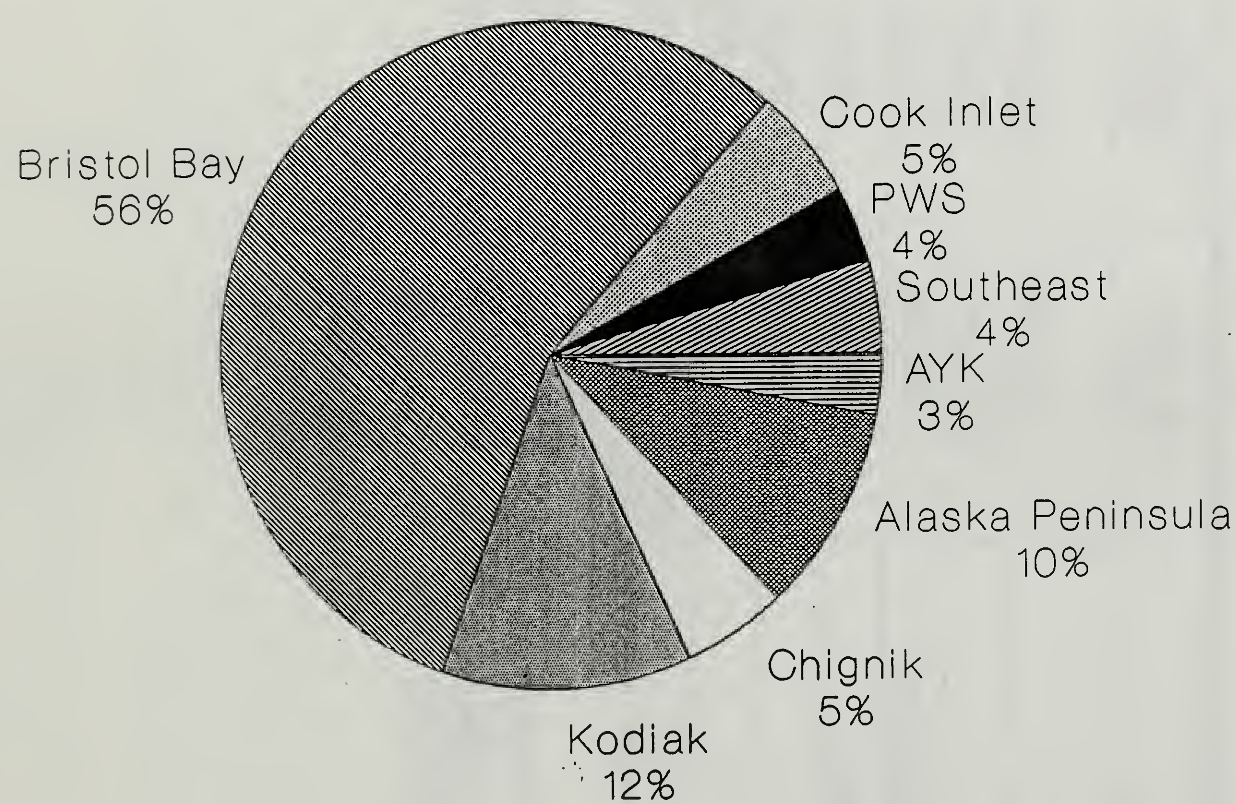
TABLE 3-17

1991 PWS Fish Ticket Landings for Salmon
Summarized by Port

Delivered to:	Fish Ticket Pounds	Number of Salmon	Number of Processors
Anchorage	5,073,704	1,667,626	5
Cordova	35,002,445	6,716,442	5
Homer/Kenai/Seldovia	7,964,689	3,049,342	5
Seward/Whittier	14,183,093	488,166	6
Valdez	34,756,449	11,328,719	4
Floaters	5,137,296	1,956,929	6
Other	4,942,662	1,919,248	4
Total	107,070,338	37,126,472	36

Source: State of Alaska, Commercial Fisheries Entry Commission, special computer run using the 1991 Fish Ticket File, June 1992.

Alaska Sockeye Harvest in 1991
by Management Area



data from ADF&G

Figure 3-9

TABLE 3-18

Average Prices Paid to Prince William Sound Salmon Fishermen
(Prices given in dollars per pound)

Species	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991
King Salmon	1.65	1.40	1.05	1.30	1.65	1.45	1.75	2.23	2.25	2.24	1.00
Sockeye Salmon	1.40	1.01	0.95	1.15	1.50	1.35	1.45	2.68	2.00	1.50	1.00
Coho Salmon	0.39	0.40	0.30	1.10	0.40	0.46	0.55	1.86	0.70	0.97	0.45
Pink Salmon	0.44	0.23	0.24	0.26	0.22	0.23	0.40	0.79	0.35	0.30	0.12
Chum Salmon	0.50	0.38	0.24	0.26	0.29	0.33	0.39	0.73	0.35	0.70	0.40

Source: 1981 - 1990, Alaska Department of Fish & Game, 1990 Annual Finfish Management Report. 1991 data from ADF&G "1991 Prince William Sound Salmon Summary" and personal communication, February 1992.

TABLE 3-19

Sport Fishing Effort and Catch Statistics in the Study Area: 1990

Location	Fishing Effort							Fishing Catch								Fishing Catch Total
	Anglers	Percent Total Anglers	Trips	Percent Total Trips	Days Fished	Percent Total Days Fished	Days Fished/Anglers	Silver Salmon	Red Salmon	Pink Salmon	Chum Salmon	Dolly Varden	Halibut	Rock fish	Other	
Salt Water																
Boat-Knight Island Passage	246	0.7	376	0.5	1,129	1.2	4.6	21	0	186	0	0	91	68	294	660
Boat-Passage Canal	3,141	8.8	5,055	7.4	8,291	8.5	2.6	844	126	789	113	82	938	942	935	4,769
Shoreline-Passage Canal	425	1.2	556	0.8	787	0.8	2.7	464	0	81	0	0	0	10	44	599
Remainder-Prince William Sound	32,082	89.4	62,702	91.3	87,793	89.6	2.7	22,345	2,435	47,881	1,799	1,357	9,822	7,137	14,230	107,006
Total	35,894	100%	68,689	100%	98,000	100%	--	--	--	--	--	--	--	--	--	--
Fresh Water																
Eshamy Creek Lagoon	246	8.1	196	2.4	278	3.4	1.0	14	175	23	0	0	0	0	0	212
Coghill River	327	9.6	229	2.9	327	4.1	1.0	28	49	12	11	49	0	0	0	149
Remainder-Prince William Sound	2,814	82.3	7,606	94.7	7,606	92.5	2.7	2,923	777	174	22	1,210	0	0	1,248	5,106
Total	3,419	100%	8,031	100%	8,066	100%	--	2,965	1,001	209	33	1,259	0	0	1,248	5,467

Coghill River (freshwater). The Esther Island alternative encompasses only Eshamy Creek and Lagoon, and the Coghill River.

Compared to Valdez Bay and road system where the majority of saltwater fishing effort and catch occurs, effort and catch in Knight Island Passage is low. Statistics for saltwater fishing along Passage Canal are presented in the Table 3-19 for purposes of comparison. Effort and catch in Eshamy Creek and Lagoon and Coghill River comprise a more significant total of freshwater catch for the Prince William Sound reporting area. Figures for Esther Island are included in the statistics for Passage Canal.

Main Bay Vicinity

Saltwater fishing effort in Knight Island Passage is a small percentage of total saltwater fishing in Prince William Sound. In 1990, the percentage of total anglers in Prince William Sound was 0.7%. Fishing occurs primarily for pink salmon; fishing for halibut, rockfish, and silver salmon also occurs. While the number of anglers and trips is relatively low compared to other saltwater parts of Prince William Sound, the 4.6 days fished per angler trip in 1990 is nearly twice the average for Prince William Sound (2.7 days per trip). Fishing occurs throughout the summer season, although the effort for salmon species occurs during the period of return to the hatchery.

Eshamy Lagoon Vicinity (remote release site)

Eshamy Lagoon is one of the fishing effort and catch reporting areas in Prince William Sound for the Alaska Department of Fish and Game. It is also considered one of the most important sport fishing sites in western Prince William Sound (ADNR 1988).

Freshwater fishing effort at Eshamy Lagoon accounts for 8.1% of 1990 freshwater anglers in Prince William Sound. The majority of the catch is sockeye salmon, followed by pink and silver salmon. The ratio of days fished per angler trip is 1.0, or almost one third of the average ratio for freshwater areas within Prince William Sound. Fishing occurs throughout the summer season, although the effort for salmon species occurs during the period of return to the lagoon and river-lake systems.

Coghill District (remote release site)

Coghill River is also one of the fishing-effort and catch-reporting areas in Prince William Sound for the Alaska Department of Fish and Game. It is also considered an important sport fishing site in northwestern Prince William Sound (ADNR 1988), and is located within weekend motor boat use from Whittier. Freshwater fishing effort at Coghill River accounts for 9.6% of 1990 freshwater anglers in Prince William Sound. The majority of the catch is for sockeye salmon, followed by Dolly Varden, chum salmon, silver salmon, and pink salmon. The ratio of days fished per angler is 1.0, or almost one third of the average ratio for freshwater areas within Prince William Sound.

Fishing occurs throughout the summer season, although the effort for salmon species occurs during the period of return to the river-lake system.

Nelson Bay (potential remote release site)

Nelson Bay is located approximately seven miles northeast of Cordova. While only accessible by boat, it is likely that some level of recreational fishing occurs there; however, no statistics are available.

Port Chalmers (Montague Island) (potential remote release site)

Port Chalmers is a remote site, accessible only by float plane or long boat trip from Cordova. The Prince William Sound Area Plan prepared by the Alaska Department of Natural Resources indicated that this area is "extensively used by Cordova residents for community recreation and hunting"; a Forest Service recreation cabin is located in this area. It is likely that some level of recreational fishing occurs incidental to other activities; however, no statistics are available.

Kings Bay (Port Nellie Juan) (potential remote release site)

Because of its distance from Whittier and Seward, the closest points of origin for recreational use, fishing would likely be incidental to other recreational uses. Areas noted for fishing are located farther towards the mouth of Port Nellie Juan, past Derickson Bay. No statistics on recreational fishing in the area are available.

Barry Arm (Port Wells) (potential remote release site)

Some recreational fishing occurs in Barry Arm, but is likely incidental to other recreational activities, such as boating and sightseeing. Fishing likely takes place near the mouths of streams or estuaries, such as Harrison Lagoon, near the intersection of Barry Arm and College Fiord. No statistics on recreational fishing in the area are available.

3.11.2 Other Recreational Uses

The Main Bay and Esther Island alternatives and the remote-release stations are located in portions of Prince William Sound that are popular for motorized and non-motorized recreational boating.

Main Bay Vicinity

In the vicinity of Main Bay, formal recreation facilities are few and recreation activities are informal and revolve around remote outdoor pursuits. A resource assessment of the Main

Bay Management Unit in the Recreation and Tourism element of the Prince William Sound Area Plan provided the following description of recreation potential:

> " The commercial fishing activity, the lack of anchorages, and the presence of close-by, more attractive recreation alternatives, make this area of moderate recreation value."

Access to the area for recreation use is by boat and float plane. Whittier is the nearest boat harbor and origin of boat access. Main Bay is considered to be within a long weekend use zone by sail and motor boats. Some recreational boaters may come from the Seward harbor, which is considerably farther away. Main Bay is located along the State Marine Highway route between Seward and Valdez, and recreation kayak users are occasionally dropped off along the way.

Lands within the Chugach National Forest have been classified using the Recreation Opportunity Spectrum (ROS), which is a framework for outdoor recreation resource managers and policy makers to address allocation and management of opportunities for recreation. This Forest Service ROS classification recognizes eight recreation experience levels. In the vicinity of Main Bay, nearshore coastal waters have been classified as SP-M (Semi-primitive motorized) and coastal lands as SP-NM (Semi-primitive non-motorized). Table 3-20 summarizes key characteristics of the ROS classification. There are no recreation use statistics for this specific area of the National Forest; Table 3-21 shows recreation visitor days by use category for the Glacier Ranger District of the National Forest, which includes Main Bay, Eshamy Lagoon, Coghill, Kings Bay, and Barry Arm.

Primary activities include boating, camping, hiking, sport hunting, and wildlife viewing and photography. With the exception of hunting, recreation activities begin in the late spring and continue into the early fall. Most sport hunting in the Main Bay area targets black bear, with hunting in the spring and early fall. Some sport hunting for Sitka black-tailed deer may also occur.

<u>Esther Island Vicinity</u>

Esther Island is the site of Esther Island State Marine Park. Esther Island is located along a popular boating route between Whittier and Valdez. It is also located along the State Marine Highway route between Whittier and Valdez. Whittier is the nearest boat harbor and origin of boat access. Esther Island is considered to be within a typical weekend use zone by sail and motor boats, and is a longer trip for non-motorized boats. Some recreational boaters may come from the Valdez boat harbor, which is significantly farther away.

A resource assessment of the Esther Island Management Unit in the Recreation and Tourism element of the Prince William Sound Area Plan provided the following description of recreation potential:

TABLE 3-20

Recreation Opportunity Spectrum (ROS) Classification Characteristics

Primitive 1	Primitive 2	Semi-Primitive Non-motorized	Semi-Primitive Motorized
ROS Experience/ Remoteness Criteria			
Extremely high probability of experiencing isolation from the sights and sounds of humans	Extremely high probability of experiencing isolation from the sights and sounds of humans	High but not extremely high probability of experiencing isolation from the sights and sounds of humans	Moderate probability of experiencing isolation from the sights and sounds of humans. Opportunity to use motorized equipment while in the area.
An area generally greater than 3 miles from all roads, railroads and system trails; greater than 1/4 mile from less accessible marine travelways.	An area generally less than 1/4 mile from low use trails (no motorized access), and less accessible marine travelways.	An area generally greater than 1/4 mile and less than 3 miles from all roads, railroads and system trails with motorized access and accessible marine travelways.	An area generally less than 1/4 mile from primitive roads and trails with motorized use, or readily accessible marine travelways.
Human Disturbance			
Setting is essentially an unmodified natural environment. Evidence of human disturbance would be unnoticed by an observer in the area.	Setting is essentially an unmodified natural environment. Evidence of human disturbance would be unnoticed by an observer in the area.	Natural setting may have subtle modification that would be noticed but not draw the attention of an observer wandering through the area.	Natural setting may have moderately dominant alterations but would not draw the attention of motorized observers on trails and primitive roads in the area.
Evidence of trails is acceptable, but should not exceed carrying capacity.	Evidence of trails is acceptable, but should not exceed carrying capacity.	Little or no evidence of primitive roads and the motorized use of trails and primitive roads.	Strong evidence of primitive roads and the motorized use of trials and primitive roads.
Structures are extremely rare.	Structures are extremely rare.	Structures are rare and isolated.	Structures are rare and isolated.

TABLE 3-21

Total Recreation Use on National Forest Lands 1991

Activity Grouping	Recreation Visitor Days	Percent of Total Use
Glacier Ranger District		
Camping, Picnicking, and Swimming	28,100	3.6
Mechanized Travel and Viewing Scenery	514,200	65.8
Hiking, Horseback Riding, and Water Travel	18,700	2.4
Winter Sports	66,900	8.9
Resorts, Cabins, and Organization Camps	22,800	2.9
Hunting	6,700	0.9
Fishing	15,100	1.9
Non-consumptive Fish and Wildlife Use	2,000	0.3
Other Recreation Activities	107,500	13.8
Total	782,000	100.0%
Cordova Ranger District		
Camping, Picnicking, and Swimming	5,300	3.8
Mechanized Travel and Viewing Scenery	83,300	60.2
Hiking, Horseback Riding, and Water Travel	10,000	7.2
Winter Sports	1,200	0.9
Resorts, Cabins, and Organization Camps	6,500	4.7
Hunting	9,800	7.1
Fishing	10,100	7.3
Non-consumptive Fish and Wildlife Use	2,400	1.7
Other Recreation Activities	9,700	7.3
Total	138,300	100.0%

Source: U.S. Forest Service 1992

"Esther Island and Esther Island Passage receive a tremendous amount of recreation use both as protected routes and as destinations in themselves."

Both remote release stations are located in portions of Prince William Sound which are popular for motorized and non-motorized recreational boating.

In the vicinity of Lake Bay on Esther Island, nearshore coastal waters have been classified as SP-M (Semi-primitive motorized) and coastal lands as SP-NM (Semi-primitive non-motorized), with a small portion of Primitive 2. Table 3-20 summarized key characteristics of the ROS classification. There are no recreation use statistics for this specific area of the National Forest; Table 3-21 shows recreation visitor days by use category for the Glacier Ranger District of the National Forest, which includes Main Bay, Eshamy Lagoon, Coghill, Kings Bay, and Barry Arm.

Eshamy Lagoon Vicinity (remote release site).

Recreation characteristics at the Eshamy Lagoon site are similar to Main Bay in that formal recreation facilities are few and recreation activities are informal and revolve around remote outdoor pursuits. It is located in the same federal management unit as Main Bay, but is located in the Chenega Management Unit of the Prince William Sound Area Plan. Eshamy Lagoon is considered to be within a long weekend use zone by sail and motor boats from Whittier. Some recreational boaters may come from the Seward harbor, which is considerably farther away. An anchorage is located in a cove on the south side of Eshamy Bay, and there are some public campsites and boat pullouts which are easements reserved under section 17(b) of the Alaska Native Claims Settlement Act.

In the vicinity of Eshamy Lagoon, nearshore coastal waters have been classified as SP-M (Semi-primitive motorized) and coastal lands as SP-NM (Semi-primitive non-motorized). Table 3-20 summarized key characteristics of the ROS classification. There are no recreation use statistics for this specific area of the National Forest; Table 3-21 shows recreation visitor days by use category for the Girdwood District of the National Forest, which includes Main Bay, Eshamy Lagoon, Coghill, Kings Bay, and Barry Arm.

Coghill District (remote release site)

The Coghill River-Lake area is a remote recreation area that receives motor boat, sail boat, and kayak use. Port Wells, College Fiord, and Barry Arm are extremely scenic and Coghill River is located within the College Fiord Management Unit of Chugach National Forest and the Port Wells Management Unit of the Prince William Sound Area Plan. The Coghill River is considered to be within a long weekend use zone by sail and motor boats from Whittier. In addition to sport fishing and boating, the area is also used for hiking. An existing Forest Service public use cabin is located along Coghill River between the bay and the lake, and a boat anchorage is located in the bay.

In the vicinity of the Coghill River, nearshore coastal waters have been classified as SP-M (Semi-primitive motorized) and coastal lands as SP-NM (Semi-primitive non-motorized), with a small portion of Primitive 2. Table 3-20 summarized key characteristics of the ROS classification. There are no recreation use statistics for this specific area of the National Forest; Table 3-21 shows recreation visitor days by use category for the Girdwood District of the National Forest, which includes Main Bay, Eshamy Lagoon, Coghill, Kings Bay, and Barry Arm. Table 3-22 lists user statistics for the Coghill Lake Forest Service cabin.

<u>Nelson Bay</u> (potential remote release site)

Proximity to Cordova indicates that Nelson Bay is likely used for a variety of recreational uses such as boating, hunting, and harvesting crab and other shellfish. The uplands are in Native ownership; recreation use is likely to concentrate in the tidelands and nearshore waters.

Because Nelson Bay lands are not administered by the Chugach National Forest, the ROS classification does not apply. There are no specific non-fisheries recreation statistics for this area.

<u>Port Chalmers</u> (potential remote release site)

Port Chalmers is extensively used by Cordova residents for community recreation and hunting; a Forest Service recreation cabin is also located in the area. The period of use extends from bear hunting in the spring, through summer activities such as fishing, and ends with fall/early winter activities including waterfowl and deer hunting. Several anchorages are also located in the area, and are used by both recreational and commercial fishing boats. State management objectives for the uplands and tidelands emphasize recreation and public access for recreation and hunting, in addition to continued use by the fishing fleet. In the vicinity of Port Chalmers, nearshore coastal lands and waters have been classified as P2 (Primitive 2). Table 3-20 summarizes key characteristics of the ROS classification. Table 3-21 shows recreation visitor days by use category for the Cordova District of the National Forest, which includes Port Chalmers and Table 3-22 lists the user statistics for the Port Chalmers Forest Service cabin.

<u>Kings Bay</u> (potential remote release site)

Kings Bay is located within the Nellie Juan Wilderness Study Area. A popular recreation and tourist destination in western Prince William Sound, it is also considered one of the three main cruise ship destinations. Three anchorages are located at the juncture of Kings Bay and Port Nellie Juan, and a campsite has been designated at the head of Kings Bay. The area is considered to be within a long weekend use zone by sail and motor boats from Whittier. The Forest Service has considered constructing public use cabins in the Nellie Juan-Kings Bay area.

TABLE 3-22

Recreation Use: Selected Forest Service Cabins 1991

Cabin/Month	Number in Party	Number of Nights	Cabin/Month	Number in Party	Number of Nights
Coghill Lake			**Harrison Lagoon**		
JAN	0	0	JAN	0	0
FEB	0	0	FEB	0	0
MAR	0	0	MAR	0	0
APR	0	0	APR	4	0
MAY	11	8	MAY	23	29
JUN	15	11	JUN	15	7
JUL	19	17	JUL	58	25
AUG	15	24	AUG	42	17
SEP	7	6	SEP	19	17
OCT	0	0	OCT	0	0
NOV	0	0	NOV	0	0
DEC	0	0	DEC	0	0
TOTAL	67	66	TOTAL	161	95
Shrode Lake			**Port Chalmers**		
JAN	0	0	JAN	0	0
FEB	0	0	FEB	0	0
MAR	0	0	MAR	2	2
APR	0	0	APR	0	0
MAY	6	9	MAY	3	4
JUN	20	15	JUN	5	1
JUL	26	17	JUL	3	3
AUG	25	22	AUG	2	4
SEP	15	12	SEP	4	3
OCT	0	0	OCT	10	13
NOV	0	0	NOV	16	13
DEC	0	0	DEC	4	10
TOTAL	92	75	TOTAL	49	53

In the vicinity of Kings Bay, nearshore coastal lands and waters have been classified as P2 (Primitive 2). Table 3-20 summarized key characteristics of the ROS classification. There are no recreation use statistics for this specific area of the National Forest; Table 3-21 shows recreation visitor days by use category for the Girdwood District of the National Forest, which includes Main Bay, Eshamy Lagoon, Coghill, Kings Bay, and Barry Arm.

<u>Barry Arm</u> (potential remote release site)

Barry Arm is located within the College Fiord Management Unit of the Chugach National Forest and the Port Wells Management Unit of the Prince William Sound Area Plan. Barry Arm is the entrance to Harriman Fiord, which is one of the most popular recreation and tourism destinations in northwestern Prince William Sound. The area is considered to be within a long weekend use zone by sail and motor boats from Whittier. It is a two-day kayak destination, and is used by both guided and independent parties. It is considered one of the three main cruise ship destinations in Prince William Sound. A popular Forest Service public use cabin is located at Harrison Lagoon, at the entrance to Barry Arm. Table 3-22 lists user statistics for the Harrison Lagoon Forest Service cabin.

In the vicinity of Barry Arm, nearshore coastal lands and waters have been classified as P2 (Primitive 2). Table 3-20 summarized key characteristics of the ROS classification. There are no recreation use statistics for this specific area of the National Forest; Table 3-21 shows recreation visitor days by use category for the Girdwood District of the National Forest, which includes Main Bay, Eshamy Lagoon, Coghill, Kings Bay, and Barry Arm.

3.12 SUBSISTENCE

Subsistence use of natural resources is a mechanism through which many rural residents of Alaska maintain their physical, economic, cultural and social existence. Title VIII of the Alaska National Interest Lands Conservation Act (ANILCA) requires the Federal Government to provide a subsistence priority to rural Alaskan residents on federal public lands. ANILCA defines subsistence as:

> ...the customary and traditional uses by rural Alaska residents of wild, renewable resources for direct personal or family consumption as food, shelter, fuel, clothing, tools, or transportation; for the making and selling of handicraft articles out of nonedible byproducts of fish and wildlife resources taken for personal or family consumption; for barter, or sharing for personal or family consumption; and for customary trade. (ANILCA, 16 USC 3113).

Rural Alaska residents include residents of communities defined as rural for subsistence purposes. In the Prince William Sound area, the communities of Chenega Bay, Cordova, Tatitlek, and Whittier are designated as rural communities, and residents of these communities can qualify as subsistence users. The towns of Valdez and Seward are not designated as rural, and their residents don't qualify as subsistence users.

The availability of mapped harvest data about where residents of Cordova, Chenega Bay, Tatitlek, and Whittier pursue their subsistence harvests was limited. Some location information is available for Cordova in Stratton (1989). The Forest Service has raw data from a mapping project conducted in Cordova in conjunction with ADF&G Division of Subsistence. These data were not available in any form, published or unpublished, for use in this EIS.

For Tatitlek, the study team viewed unpublished harvest maps at ADF&G for marine mammal, deer, and crab harvests. For Chenega Bay, Stratton and Chisum (1986) presented two sets of subsistence harvest maps. The first set indicates hunting areas by species or species group from the early 1960s when residents lived at the original village site of Chenega on Chenega Island. The second set of maps from the mid-1980s is considered limited in representation because residents had just moved to this village site in 1984 and were not yet completely familiar with the area in terms of subsistence possibilities. Stratton and Chisum (1986) also suggest that villagers were initially under-equipped and they anticipated that hunters would have better access to subsistence opportunities in the future as they acquired the necessary equipment. A final source of location information came from an unpublished draft table of ADF&G subsistence data. This table reports what percentage of Tatitlek and Chenega Bay households use different areas of Prince William Sound to obtain salmon, finfish, shellfish, waterfowl, deer and marine mammals. These data must be considered highly preliminary and should be rechecked with ADF&G before basing any actions on them. There is no data available on the specific areas used by Whittier residents for subsistence. The Alaska Department of Fish and Game has mapped harvest data but it is unavailable at this time.

Subsistence regulations in Prince William Sound allow the harvest of all species of salmon providing that the fishermen obtain a state-issued subsistence salmon fishing permit. The numbers of salmon allowed and the timing of the subsistence fishery varies depending on the area and species. Subsistence fishermen usually employ gillnets similar to those used during commercial fishing operations. Subsistence fishing activities often occur during commercial fishing openings.

The ADF&G reported subsistence harvest data for Chenega for the years 1985-86 (Stratton and Chisum 1986), for Tatitlek for 1988-89 (Stratton 1990), and for Cordova for the year 1986 (Stratton 1989). ADF&G also collected subsistence data for Chenega and Tatitlek for two years following the Exxon Valdez oil spill. Subsistence harvests were severely depressed following the oil spill, consequently post-spill data likely do not represent an accurate baseline. The earlier data (i.e., pre-spill) are used instead.

3.12.1 Chenega Bay

Chenega Bay, located about 30 air miles south of Main Bay, is the nearest community to the Main Bay hatchery (Figure 3-10). Chenega Bay was established in 1984 at its present location on Evans Island, having existed previously in another location in Prince William Sound until the 1964 earthquake and tsunami destroyed the old village. The 1990 U.S. Census enumerated 94 residents of Chenega. There are 29 households, yielding a mean household size of 3.2 persons. Sixty-five percent of the population was Native. The Natives of Chenega Bay are predominantly Alutiiq.

Chenega Bay is an unincorporated village locally governed by an Indian Reorganization Act (IRA) council. In 1986, the IRA council had two committees, a Health Committee and a Native Education Committee that worked under the council's direction on community programs. The Health Committee coordinated between the regional non-profit corporation (the North Pacific Rim), and the local community health aide, community health representative and the Village Public Safety Officer (VPSO). The Native Education Committee administered the Johnson-O'Malley funds and in 1986 was considering implementation of a bilingual education program (Stratton and Chisum 1986).

Beginning in 1980, the Chenega Native Corporation participated with other village corporations in the Afognak Joint Venture to secure logging interests on Afognak Island. The Armin F. Koernig hatchery (also commonly known as the Sawmill Bay hatchery) is located two miles from the village. Both the hatchery and the village are located on the same bay. The village, accessible only by air or water, has a public dock but no runway; all airplanes must be equipped with floats. Mail is delivered twice a week by float plane, weather permitting. As recently as 1990, a privately owned store used to open in the summer to cater to transient fishing boats, but most local people purchased food from Anchorage or Seward to supplement their subsistence harvests. The store is not currently in business.

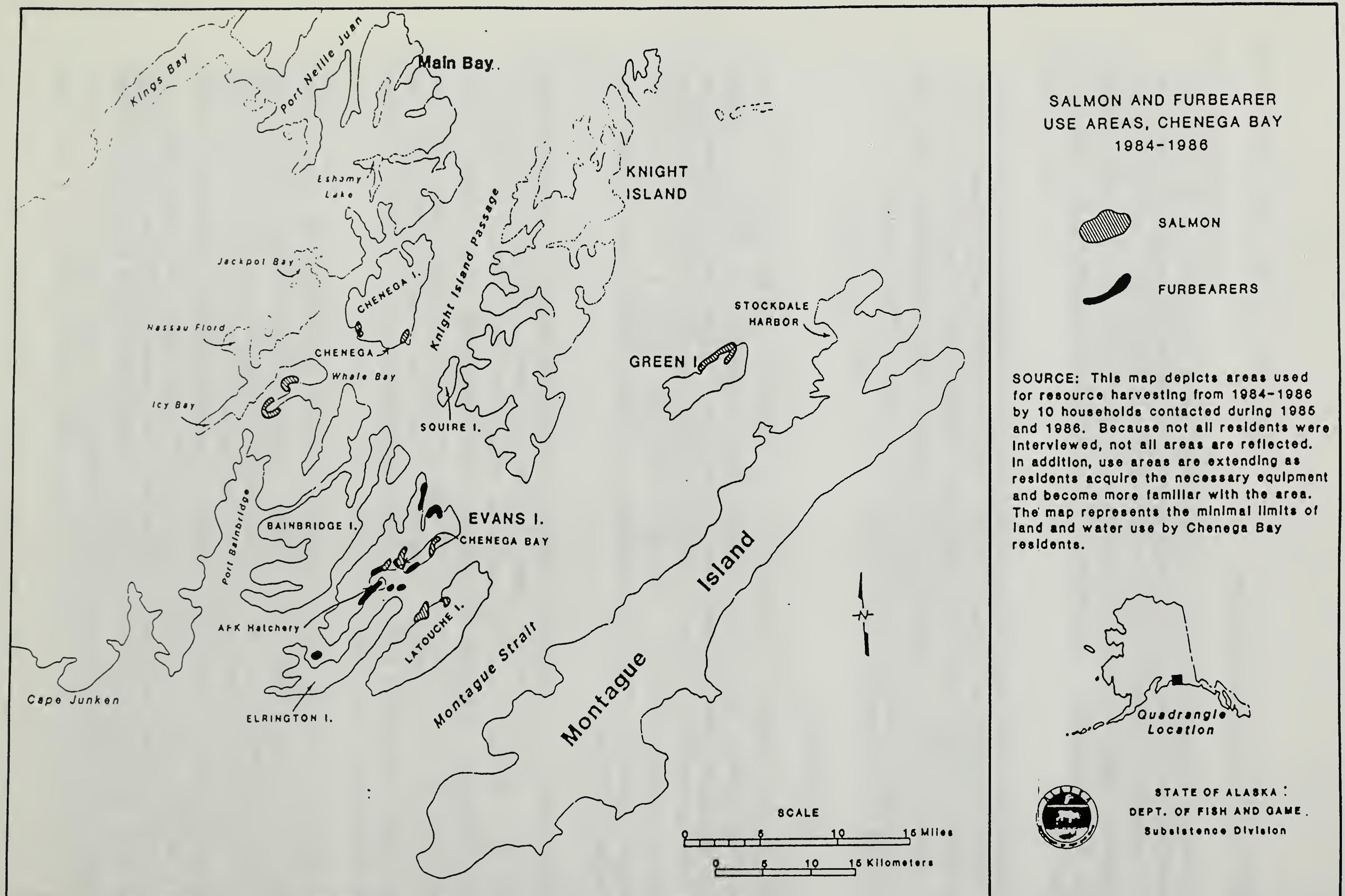


Figure 3-10 Location of Chenega Bay Village & Salmon Subsistence Use Areas (Source: Stratton & Chisum, 1986).

In 1985, commercial fishing was the primary source of employment, while construction was the main employment in 1986. Government services also contributed to the village economy. Twenty-five Chenega residents were employed an average of 4.9 months each in 1985-86 (Stratton and Chisum 1986). In 1992, Chenega Bay residents worked in the following kinds of employment:

- Community health aide
- Community health representative
- Village Public Safety Officer
- Village corporation (three people on staff)
- IRA council (two to three office staff, plus one utilities person)
- Postmistress
- School (three to four people)
- Commercial fishing

In 1991, four residents held nine commercial fishing permits. Of those nine permits, two were for the salmon drift gillnet fishery, three were for halibut, three were for other finfish and one was for shellfish (Table 3-23). It is noteworthy that no one in Chenega Bay owned any set gillnet or purse seine salmon permits. As Table 3-23 indicates, the last year that a Chenega Bay resident owned a salmon purse seine permit was 1987. Although few permits are held by Chenega Bay residents, additional people may be employed as crew members on commercial fishing operations. In addition to some residents working for the local permit holders, some people may also crew for permit holders from other communities.

Chenega Bay is a predominantly Alutiiq village in which subsistence is of primary importance. Although the community operates on a mixed subsistence and cash economy, subsistence is the traditional means by which the Alutiiq people of Prince William Sound supported themselves for centuries and continue to do so today. Subsistence is not only an economically and nutritionally important source of food, it is also a core element of Alutiiq culture and identity. The cash economy is an addition to the subsistence economy and way of life that has been adopted in a manner compatible with and supportive of the traditional subsistence patterns. The majority of the subsistence data that follow are from ADF&G Technical Paper No. 139, "Resource Use Patterns in Chenega, Western Prince William Sound: Chenega in the 1960s and Chenega Bay 1984-1986" (Stratton and Chisum 1986), and describe the years 1985 and 1986. These are the best pre-spill data available for Chenega Bay. However, at the time the data were collected, residents had only recently (1984) established their community in its new location after 20 years during which the old Chenega population was dispersed across several other towns and villages. In 1985 and 1986, residents were still getting to know their new subsistence harvest area. Consequently, harvest quantities and mapped areas should be considered minimum use levels and areas.

TABLE 3-23

Ownership of Commercial Fishing Permits (All Districts)
by Chenega Bay Residents by Year and Gear Type

Permit Type	1987	1988	1989	1990	1991
Salmon Purse Seine	1	0	0	0	0
Salmon Drift Gillnet	1	2	3	2	2
Halibut	0	1	1	2	3
Other Finfish	0	1	1	2	3
Herring Roe-on-Kelp	0	0	1	0	0
Shellfish	0	0	0	0	1
Total Number of Permits	2	4	6	6	9
Number of People Holding Permits	2	2	4	3	4

Source: Commercial Fisheries Entry Commission, 1992 data run.

The annual cycle of subsistence activity begins in the spring (March and April) with black bear hunting and herring fishing. In May, salmon harvests begin with the arrival of king salmon, soon followed by sockeye. Gathering activities increase in May also. At that time, people are gathering razor clams, cockles, seaweed, plants and bird eggs. During the summer months of June and July, people concentrate most of their effort on harvesting salmon (both commercially and for subsistence) and the labor involved in preserving it. They also hunt seals, typically while out commercial salmon fishing. In the late summer and fall months (August, September and October), people pick berries, fish for silver salmon and shrimp, and hunted game (mainly goat, moose and deer) and waterfowl. Winter activities include the continuation of hunting for goat, deer, small game and marine mammals. Species that are pursued throughout the year include bottomfish, intertidal resources, shrimp and marine mammals.

In 1986, all households in Chenega Bay attempted and successfully harvested resources. Households obtained between five and 28 different types of subsistence products, averaging 14 different types per household. The most commonly harvested species (in terms of the percentage of households harvesting) were clams, halibut, berries and deer. All households used halibut, shrimp, deer, berries and at least one species of salmon.

Residents of Chenega Bay harvested 1,286 pounds of subsistence resources per household or 361 pounds per capita (Appendix 3-6). Use of resources averaged 866 pounds per household or 243 pounds per capita. Use levels were lower than harvest levels due to sharing with people in other communities. Marine mammals represented the largest proportion of the total community harvest by weight, providing approximately 7,996 pounds of edible food. Salmon constituted the second largest amount (4,286 pounds), 21 percent (by weight) of the total community subsistence harvest. An estimated 2,920 pounds of deer and 2,335 pounds of halibut were also major components of the 1985-86 subsistence harvest (Stratton and Chisum 1986).

In 1985, Chenega Bay residents caught salmon for home use by means of commercial gear (i.e., keeping part of their commercial catch for home use or for giving to others), rod and reel, and subsistence methods (i.e., using gillnets or harvesting by hand with gaffs directly from creeks). Table 3-24, taken from Stratton and Chisum (1986), presents the quantities harvested and number of households doing so by salmon species and gear type. As this table indicates, the majority (61 percent) of the salmon obtained for home use were a by-product of the commercial harvest. Of the total 4,286 pounds, 2,617 pounds came from commercial fishing. During 1985, the only provision for subsistence salmon fishing under state regulations was during commercial openings with commercial gear in the areas open to commercial fishermen. These regulatory restrictions are the reason that most salmon used for subsistence purposes were obtained while commercial fishing. Subsistence efforts produced approximately 1,265 pounds, or 30 percent of the total take of salmon for home use. About nine percent were caught by rod and reel. The majority of the king, sockeye, chum and coho salmon were taken from commercial harvests. Pink salmon was the only species harvested principally through subsistence and rod and reel efforts.

TABLE 3-24

Chenega Bay Salmon Harvest for Home Use by Species and Gear Type, 1985.

Salmon Species	Commercial Gear[a]		Rod and Reel		Subsistence[b]		Totals			
	No. Households	Harvest (lbs)	No. Households	Harvest (lbs)	No. Households	Harvest (lbs)	No. Households	Harvest (lbs)	(lbs)	Percent
King	5	799.5	0	--	1	39.0	6	43	838.5	19.6
Sockeye (Red)	5	487.9	1	45.1	2	172.2	8	172	705.2	16.5
Pink	3	189.6	4	124.8	6	372.0	9	286	686.4	16.0
Chum	5	416.0	0	--	5	326.4	9	116	742.4	17.3
Coho (Silver)	5	724.2	4	234.3	1	355.0	8	185	1,313.5	30.6
Total Harvest		2,617.2		404.2		1,264.6	12		4,286.0	100.0
Percent		61.1		9.4		29.5			100.0	

Source: Stratton and Chisum 1986.

[a] Only fish removed for home use or given away are included.
[b] Households used gill nets, or harvested directly from creeks.

The salmon species harvested for subsistence use are shown in Table 3-25. These data indicate that coho salmon were the largest proportion (31 percent) of the total subsistence harvest in 1985, followed by king salmon at 20 percent. These two species together represented just over half of the subsistence harvest by weight. Pink, chum and sockeye salmon represented virtually equal proportions of the subsistence harvest at 16, 16 and 17 percent respectively. The proportions shifted dramatically following the oil spill. Sockeye salmon were the largest proportion (39 percent) of the total salmon harvest in 1989, and were second to chum salmon in 1990. The proportional distribution of the salmon species for each of the three data years is summarized in Table 3-26. Whereas Chenega residents in the 1960s used summer fish camps away from the village to obtain their subsistence salmon harvest for the year, this approach was not being practiced in 1985 from the new village site. Subsistence and rod and reel salmon harvests in 1985 were taken mainly on Evans Island and, to a lesser extent, Green Island during day trips from the village (refer back to Figure 3-10). As the map indicates, Chenega Bay residents also obtained salmon from Chenega Island, the Whale Bay area and Latouche Island in 1984-1986. Unpublished ADF&G data on Chenega Bay salmon harvests suggest that more recently households have used several locations to harvest salmon. These data are not presented by salmon species nor by gear type. The following areas are used "regularly" according to residents; the percentage of Chenega Bay households saying they use the area regularly is indicated in parentheses:

Tatitlek, Bligh Island (6%)
Chenega Island (11%)
Green Island/North Montague Island (6%)
Eshamy (6%)
Dangerous Passage/Whale Bay (17%)
Knight Island Passage (11%)
Jackpot Bay (17%)

Additionally, in 1988 six percent of Chenega Bay households used the Port Wells/College Fiord/Coghill area to catch salmon, although no households reported that they used that area "regularly."

The other key species group that is relevant to the proposed Main Bay expansion and Esther Island alternative is marine mammals insofar as increased commercial fishing stemming from the proposed expansion may result in increased incidental take of marine mammals in commercial fishing nets, thus impacting subsistence marine mammal harvests. Marine mammals represented the largest proportion, 39 percent, of Chenega Bay residents' subsistence harvest (by weight) in 1985-86. Although 44 percent of households harvested harbor seal and sea lion, 80 percent of the village households reported using these resources. Thus, those households harvesting these species shared them widely with other households in town. Chenega Bay residents harvested a total of 25 sea lions and 145 harbor seals in 1985-86. The community harvest of sea lions amounted to 2,500 pounds of edible meat, or 167 pounds per household. The community harvested 5,481 pounds of harbor seal, averaging 343 pounds per household.

TABLE 3-25

Chenega Bay Subsistence Salmon Harvest, 1985 - 1986

Salmon Species	Total Number Harvested	Total Pounds Harvested	Percent of Total Salmon Harvest[1]	Pounds per Household	Pounds per Capita
King	43	839	20	56	16
Sockeye (Red)	172	705	16	47	13
Pink	286	686	16	46	13
Chum	116	742	17	50	14
Coho (Silver)	185	1,314	31	88	24
Total Salmon	802	4,286	100	287	80

Source: Stratton and Chisum 1986.

[1] Percentage data calculated; not provided in Stratton and Chisum (1986).

TABLE 3-26

Distribution of Subsistence Salmon Harvest by Species by Year, Chenega Bay, 1985 - 1986

Salmon Species	1986-86 (%)	1989 (%)	1990 (%)
King	20	1	15
Sockeye (Red)	16	39	23
Pink	16	37	22
Chum	17	21	30
Coho (Silver)	31	2	10
Total Salmon	100	100	100

Source: Stratton and Chisum 1986, ADF&G data runs.

In 1984-1986, Chenega Bay residents hunted marine mammals across a large area of western Prince William Sound and, to a lesser extent, in the eastern part of the sound. Figure 3-11 shows Chenega Bay residents' use areas (i.e., where people hunted, both successfully and unsuccessfully), although neither the map nor the text specify seasons or species. As this map suggests, the highest concentration of marine mammal hunting occurred in the waters within a 10 to 20 kilometer radius from the village. In addition, Knight Island Passage, Chenega Island and the outer shoreline of the Main Bay/Eshamy Bay area also were used, as well as points farther north, west and east.

3.12.2 Tatitlek

Tatitlek is an Alutiiq village located in the northern section of Prince William Sound, 40 miles northwest of Cordova and 22 miles south of Valdez. Access is by either airplane or boat. Over the last 100 years, since 1880, the population of Tatitlek has averaged about 97 persons. In 1990 the population of the village was 119 people, 87 percent of whom were Native, living in a total of 33 households (Alaska Department of Labor 1991). Besides the permanent population, three teachers resided in the village during the school year. The village is governed by a seven person traditional council reorganized under the Indian Reorganization Act (IRA) of 1936. Funding for the council's operations comes from federal and state grants, state revenue sharing, income from laundromat and utilities, and rental income from three warehouses and a phone house (McClintock 1989). No community store exists in Tatitlek. Residents purchase groceries either in Valdez, Cordova, or occasionally Anchorage.

Tatitlek residents maintain a subsistence economy based on cash and the harvest of wild resources for home use. The major source of cash income is the commercial fishing industry. During the years 1987 through 1989, 60 percent of the population were involved in catching fish for commercial purposes (Stratton 1990). No one in the village worked in commercial processing (Stratton 1990). In 1991, five Tatitlek residents held 13 commercial fishing permits. These included one salmon drift gillnet and three salmon purse seine permits, three halibut permits, four other finfish permits, and two invertebrate permits (Table 3-27). Approximately 13 people worked as crew members on fishing boats (Stratton 1990). In addition, approximately six people worked for Alutiiq Pride, an oyster farming operation that began in 1990.

Village employment outside of the commercial fishing industry is limited. Fifty percent of the Tatitlek workforce is employed by the school district, almost exclusively on a part time basis. Jobs include gym coordinator, maintenance person, teacher's aides and administrative staff. The North Pacific Rim, the regional non-profit corporation employs a part-time community health aide (CHA) hired through the village council, a full-time community health representative (CHR) and a full-time Village Public Safety Officer (VPSO), who is not a Tatitlek Native. Another community health aide is employed full-time by the village council as is full-time power plant operator, a part-time water treatment operator and a part-time maintenance man (McClintock 1989). During the period 1988-89 the average household income was between $28,000 and $30,000 (Stratton 1990).

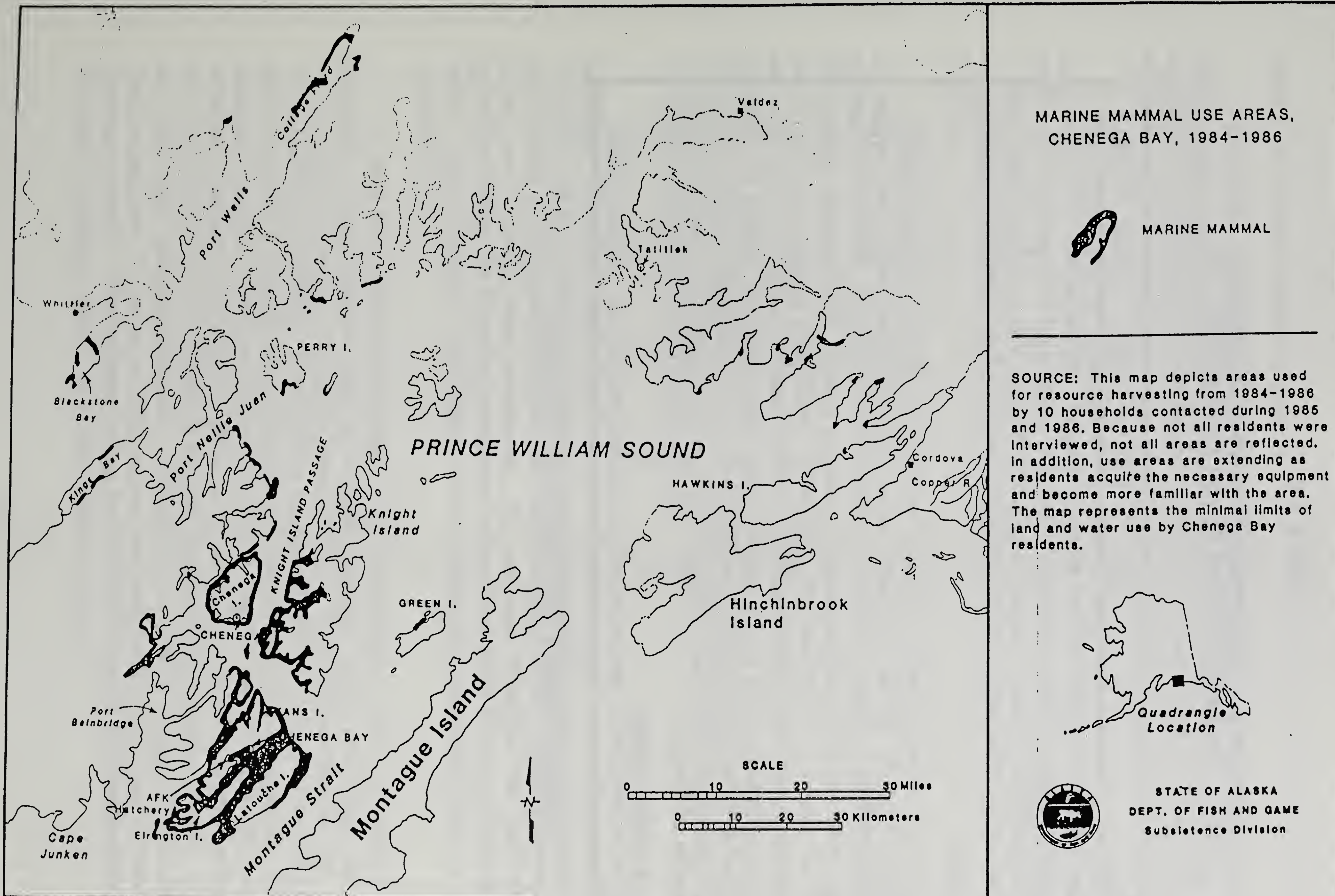


Figure 3-11 Marine Mammal Use Areas, Chenega Bay (Source: Stratton & Chisum, 1986).

TABLE 3-27

Ownership of Commercial Fishing Permits (all districts)
By Tatitlek Residents By Year and Gear Type

Permit Type	1987	1988	1989	1990	1991
Salmon Purse Seine	4	4	4	4	3
Salmon Drift Gillnet	5	4	4	2	1
Halibut	6	7	3	3	3
Other Finfish	7	9	5	3	4
Herring	1	0	0	0	0
Herring Roe-on-Kelp	1	1	0	0	0
Shellfish	2	3	1	1	1
Octopus	0	0	0	1	1
Other	2	1	2	0	0
Total Number of Permits	28	29	19	14	13
Number of People Holding Permits	11	12	9	6	5

Source: Commercial Fisheries Entry Commission, 1992 data run.

The off-site socio-economic affected environment includes areas where fishing fleets and fish processing companies utilize fish that would be produced by the Main Bay and Esther Island alternatives. These include the communities of Whittier, Seward, Cordova, Valdez, Chenega, and Tatitlek.

The harvest and use of subsistence resources is integral to maintaining the health and well-being of the Tatitlek people. Subsistence foods are less expensive and are considered nutritionally superior to foods purchased in a store. Subsistence resources provide a supplement to cash, which is often a scarce commodity in Native villages. Finally, harvesting, preparing and consuming subsistence foods is of basic importance to the culture of the Alutiiq people of Tatitlek.

Tatitlek residents use at least 75 different subsistence resources but the most important are salmon and marine mammals. Of a mean subsistence harvest of 2,328 pounds per household, in 1988-89, 41 percent of the harvest was salmon, primarily coho or silver salmon (380 pounds) (Stratton 1990). Marine mammals comprised another 20 percent while game and other finfish each made up an additional 14 percent. The remaining 11 percent of the harvest was composed of marine invertebrates (chitons, five types of clams, and octopus), berries, birds (including six kinds of ducks) and birds eggs. Between 95 and 100 percent of all households use salmon, while 100 percent use deer. Similarly between 89 and 95 percent of the households use harbor seal and at least three quarters of the households use halibut, roe on kelp, octopus, red snapper, shrimp and berries (Stratton 1990).

Spring, summer, and fall are generally the busiest periods of the year for subsistence harvesting. The seasonal round begins in April with the herring harvest. Village residents fish for herring and gather herring roe on kelp. Low spring tides also give people opportunities to dig for clams, pick chitons or gumboots, and hunt for octopus. While spring is a favorite period of the year to harvest these invertebrates, they are taken throughout the year, whenever opportunity allows. Of all marine invertebrates, octopus contributes the most to the total village harvest, with an estimated 1,643 pounds, or two octopus per person, being taken in 1988-89 (Stratton 1990).

In May the salmon harvest begins. The first salmon to arrive are chinook salmon followed by sockeye salmon. Later in July pink and chum salmon arrive, and coho salmon begin to appear in August. The three methods of salmon harvest are commercial nets, rod and reel and subsistence methods. Fish caught in commercial nets come typically from drift gillnets, although fish are also taken out of purse seines. Fish taken from the commercial fishery for subsistence purposes come most often from the Coghill hatchery area (Stratton 1990). Subsistence methods include gillnet, purse seine and dip net. In 1987-88, 65 percent of the subsistence salmon harvest was retained from the commercial catch while in 1988-89, 76 percent was caught under subsistence regulations. This shift is attributed to changes in state subsistence fishing regulations. Beginning in 1988, residents with commercial permits were allowed to hold subsistence permits. The subsistence season was expanded to include additional periods beyond the regular commercial season. Bag limits were also removed.

Once the commercial salmon season is closed, Tatitlek residents begin their fall subsistence harvests. From late August through October the people harvest deer, goat, black bear, an occasional moose as well as ducks and geese. Of the terrestrial animals, deer are the most significant and provide between 10 and 20 percent of the total village subsistence harvest (Stratton 1990). Deer are most numerous on islands in Prince William Sound and hunting requires a skiff or larger boat. Tatitlek hunters use several islands near the village in the northern part of Prince William Sound and go as far afield as Montague Island. Black bear are hunted in similar habitat as deer.

Harbor seal, sea lions and sea otters are hunted throughout the year. Of these, harbor seal contribute the largest amount to the household diet, followed by sea lion (Stratton 1990). Sea otters are taken for their fur, the meat not being eaten. Harbor seals comprise between 60 and 90 percent of the sea mammal harvest and 19 percent of the entire village harvest, at an estimated 8,000 lbs (Stratton 1990). They are hunted by skiff or larger boat with hunters occasionally landing and hunting from land. While only about half of the households had seal hunters, almost all households used seal (Stratton 1990).

The harvest area of Tatitlek residents includes the entire northern half of Prince William Sound from Port Gravina on the east to Port Wells on the west (Figure 3-12). Included in this general use area is the northern half of Montague Island and all of Naked Island. The shoreline of this entire area is utilized by Tatitlek people while marine harvest areas are concentrated in the areas around Tatitlek village, including Port Fidalgo, Boulder Bay, Tatitlek Narrows, Galena Bay and Jack Bay, the waters in and around Columbia Glacier and around Naked and Perry Island. Salmon harvests take place within an area that includes Port Fidalgo to the east, Jack Bay to the north and Glacier Island to the west. Marine mammals are hunted throughout the north half of the sound as far west as Port Wells and around Esther and Perry islands. Similarly deer and bear are hunted in the northern half of Prince William Sound including the northern portion of Esther Island (Stratton 1990).

3.12.3 Cordova

The majority of the subsistence data that follow are from two ADF&G studies on Cordova resource harvests. Technical Paper No. 153, "Resource Uses in Cordova, A Coastal Community of Southcentral Alaska" (Stratton 1989) covers harvests for the year 1985. The data are based on a survey of 206 randomly selected households and 26 key informant interviews conducted in 1986 regarding 1985 subsistence activity. The sample represents 24 percent of Cordova households. Technical Paper No. 204 covers 1988 resource harvests and is entitled "Cordova: A 1988 Update on Resource Harvests and Uses" (Stratton 1992). Data were collected in February 1989 from a stratified, randomly selected sample of 101 households. Data from the 1985 study are presented only for the study households, except where otherwise noted. In contrast, the 1988 data appear to have been weighted to represent the entire community.

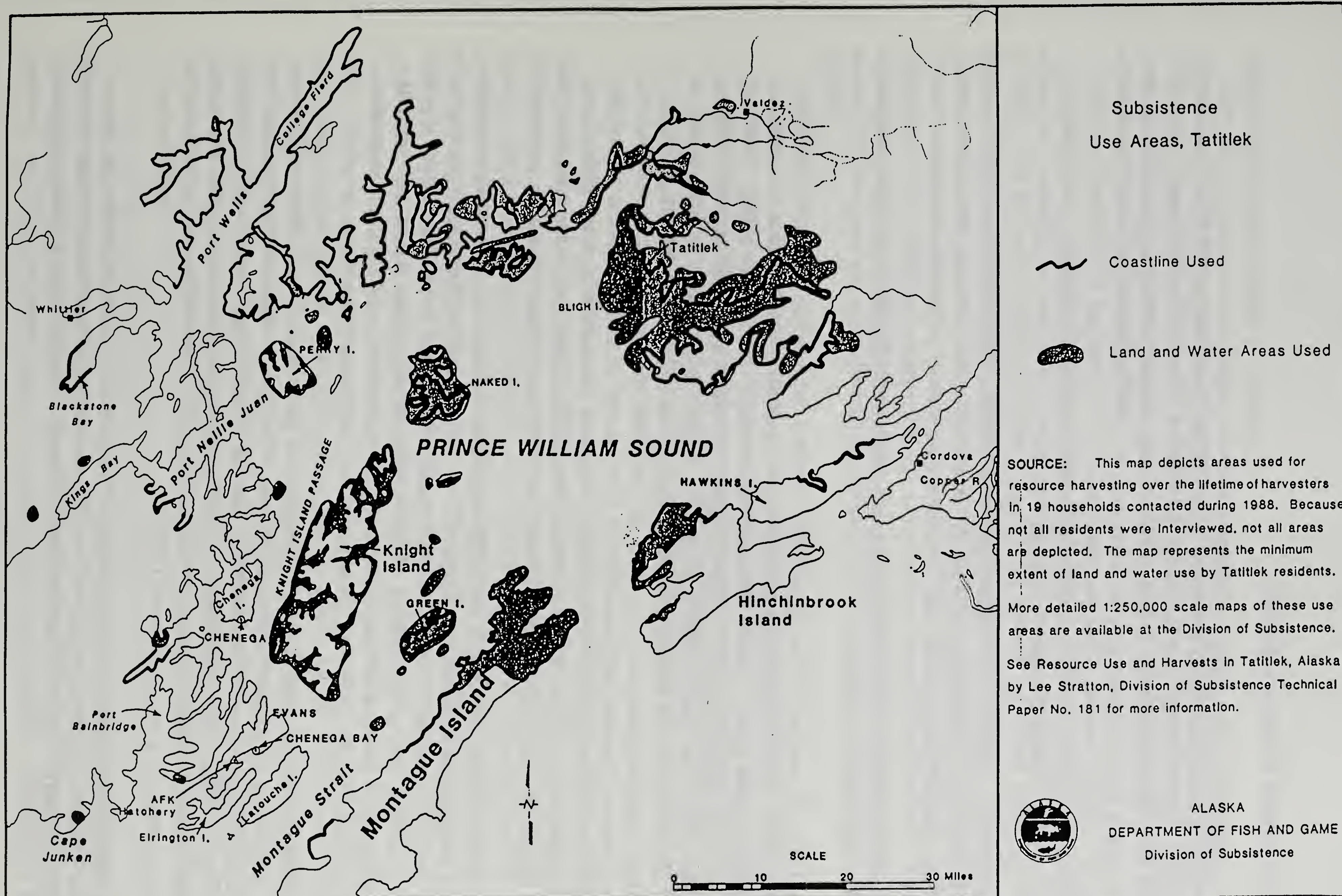


Figure 3-12 Location of Tatitlek Village and Subsistance Use Areas (Source: Stratton & Chisum, 1986).

The annual cycle of Cordova subsistence harvests begins in the spring (April) with herring. Hunting black and brown bears also occurs in April and May as the bears come out of hibernation. In mid-May, salmon harvests begin with the arrival of king and sockeye salmon returning to the Copper and Bering rivers. Pink and chum salmon harvests are concentrated in July and August in Prince William Sound. Silver salmon arrive last and are harvested from July to September. Halibut harvests occur year round but are concentrated in the months of May through September. Berries are harvested in the summer and early fall months; other plants are harvested from early spring through the summer months.

After fishing, hunting land mammals generally begins. Deer season runs from August through December, and black bears are hunted in the fall. Goat, moose, small game and waterfowl are typically hunted in the fall. Furbearers are hunted in the winter months.

In addition to halibut, most shellfish species (clams, crab and shrimp), rockfish, seal and sea lion can be obtained year round.

In 1985, 89 percent of the households surveyed successfully harvested subsistence resources, while 91 percent attempted to harvest and 99.5 percent used subsistence resources that they harvested or were given. (These numbers were virtually the same in 1988). Residents reported obtaining approximately 81 different types of resources in 1985 and 119 different resources in 1988. The larger number of species in 1988 is due partly to greater care in recording species data rather than generic data, e.g., pintail duck rather than simply "duck". The average household harvested 7.2 types of resources and used 10.8 in 1985. This discrepancy between harvests and use reflects a high amount of sharing between households, corroborated by another statistic: 79 percent of Cordova households reported giving away harvested resources in 1985, while 96 percent of households reported receiving resources. In 1988, 88 percent of households reported sharing and 91 percent reported receiving resources.

Among surveyed households, the 1985 subsistence harvests (i.e., items harvested for home use) averaged 403 pounds per household, or 152 pounds (edible weight) per capita. Harvests increased considerably in 1988 to 645 pounds per household and 234 pounds per capita. The largest increase was in the category of non-salmon finfish (mainly halibut and rockfish). Also increased were harvests of marine invertebrates, game, birds and eggs, and vegetation. Only the increases in non-salmon finfish and birds were statistically significant.

In 1985, the most significant resource group in proportion of total edible weight was salmon, constituting 38 percent of the total harvest. The broad category of game (including terrestrial and marine mammals) represented 27 percent of the total harvest by weight, followed by the category "other fish" at 23 percent. In 1988, the increased harvests of other fish were substantial enough to make that category the largest (39 percent) followed by salmon (25 percent) and game (22 percent) (Stratton 1992).

In terms of individual species harvested in 1985, moose represented the largest share of household harvests (18 percent) followed by coho salmon (14 percent), deer (13 percent) and halibut (10 percent). ADF&G estimated that the entire community of Cordova harvested

approximately 343,503 pounds of wild resources of which 133,068 pounds were salmon. In 1988, halibut was the major species harvested at 25 percent, followed by coho salmon (14 percent), deer (11 percent) and moose (nine percent). Community harvests totalled approximately 562,762 pounds in 1988.

Despite a proportional shift in salmon from 1985 to 1988, the per capita harvest of salmon was virtually the same in both years: 62.3 pounds per person in 1985 and 59.3 pounds in 1988. Of the total subsistence salmon harvest, 63 percent was taken from commercial harvests in 1985. In other words, people who fished commercially generally took a portion of their catch for home use rather than selling it to the processor. Another 35 percent of the 1985 salmon harvest was obtained by rod and reel (Stratton 1992). This trend changed in 1988 when 45 percent of the subsistence salmon harvest came from commercial catches, and 52 percent came from rod and reel. In both study years, the remaining two to three percent of the salmon harvest for home use was taken through the official subsistence fishery. According to Stratton (1989):

> "For the most part, subsistence salmon regulations have become more restrictive since 1960, placing subsistence fishermen in direct competition with commercial fishermen. Rod and reel fishing regulations have also seen progressively more restrictive bag limits, areas closed to angling, and season limitations since 1960.... Under the regulatory system existing in 1985, it is not surprising that the majority of the salmon harvest for home use came from commercial catches."

Cordova salmon harvests for home use consisted mainly of coho salmon, which were nearly half (46 percent by weight in 1985 and 55 percent in 1988) of the total salmon harvest for home use. King and sockeye salmon together made up virtually all the remainder of the harvest. King salmon were 25 percent of the harvest in 1985 and 22 percent in 1988, while sockeye salmon were 24 percent of the 1985 harvest and 16 percent of the 1988 harvest. Pink and chum salmon were three percent each in 1985, and three and five percent respectively in 1988. In 1985, nearly equal amounts of king, sockeye, and coho salmon were taken from the commercial harvest for subsistence purposes (6,200 to 6,600 pounds of each species, among households surveyed). Coho salmon became the dominant species in overall home use because they were the main species taken by rod and reel. Survey households caught 8,410 pounds of coho salmon by rod and reel compared to 1,287 pounds of king salmon, 890 pounds of sockeye salmon, 557 pounds of pink salmon and 192 pounds of chum salmon. In 1988, the subsistence take from commercial catches was less evenly distributed across species. Cordovans took 26,526 pounds of king salmon, 19,150 pounds of sockeye salmon, 10,789 pounds of coho salmon and 7,155 pounds of chum salmon from the commercial catch. Their rod and reel harvests of coho salmon totalled 66,280 pounds, by far the largest catch of any salmon species by any gear type.

Of the relatively minor official subsistence salmon fishery, sockeye salmon were the dominant species harvested (57 percent) in 1985. In 1988, king salmon were the highest followed closely by sockeye salmon. According to Stratton (1989), the dominance of sockeye salmon in the 1985 subsistence fishery is consistent with historical patterns. Subsistence gillnet

harvests for sockeye and coho salmon generally were in the Copper River Flats and Prince William Sound. Cordova residents fished for king salmon almost exclusively in the Copper River Flats under the official subsistence fishery, while pink salmon were taken just in the Prince William Sound area. Averaged over 25 years, 59 percent of the subsistence fishery harvests occurred in the Copper River Flats.

In 1985, most of the rod and reel fishing occurred in the Eyak and Alaganik rivers which are accessible by road from Cordova. Most of the coho salmon caught by rod and reel came from the Eyak River. Other rod and reel fishing occurred, as mentioned, on the Alaganik River as well as Orca Inlet, Simpson Bay, McKinley Lake and on islands in Prince William Sound. (Stratton did not update location information in the 1992 report.)

In terms of the commercial fishery by-catch of salmon for home use, Cordova residents participate in three commercial fisheries: drift gillnet, purse seine and set gillnet. The three main species that people took from the commercial fishery (sockeye, king, and coho salmon) were the most valuable species in terms of market price. Choosing to keep the most valuable salmon species is an indicator of the importance placed on salmon for home use.

Unfortunately, specific harvest location data were not published in these reports. However, as the previous discussion indicates, most salmon came from the commercial catch in Prince William Sound and the Copper River Flats. Thus, subsistence harvest locations can be inferred generally from information for commercial harvests by Cordova fishermen for sockeye, coho and king salmon. Areas where Cordova residents catch salmon by rod and reel were listed above.

Marine mammal hunting could be affected by increased commercial fishery activity from the Main Bay hatchery expansion. Cordova harvests of marine mammals were minimal. In 1985, surveyed households harvested approximately 265 pounds of harbor seal and used approximately 411 pounds (meaning households outside the sample may have harvested and shared seal meat with sample households). Only two households in the sample harvested seals in 1985. Five households utilized sea lion and one household in the sample harvested sea lion. Marine mammal harvests in 1988 decreased approximately 20 percent from the 1985 harvests.

Deer were a more popular resource among Cordova households. Half of the 1985 survey households reported that at least one person in that household hunted deer; 42 percent of all survey households were successful. In 1985, survey households harvested 218 deer which yielded an average of 42 pounds per household or 16 pounds per person. Harvests increased in 1988 to 72 pounds per household or 26 pounds per capita. Deer season ran from August through December. Hunters used the road system to hunt deer, but more commonly they used a skiff or commercial fishing boat. Some use of airplanes and all terrain vehicles was also reported. (Some hunters used a combination of vehicles, e.g., they carried their 4-wheeler in their skiff). Smaller boats were used to access Hawkins and Hinchinbrook islands mainly, while larger boats were used to access more remote areas such as Montague Island or other locations in Prince William Sound.

3.12.4 Whittier

Whittier is located at the end of Passage Canal in the northwest corner of Prince William Sound. In the mid-1940s, Whittier was founded as a military port. During World War II, two railroad tunnels were built by the U.S. Army which connected the port with the Alaska Railroad system at Portage. The community was incorporated as a fourth class city in 1969. The town can be reached only by railroad or boat.

During the 1950s, the population of Whittier was over 1,000 people. In 1990, the population was 243 people. There are only four single family dwellings in the community, and these are occupied seasonally. The majority of residents live in two multi-unit complexes. The population of the community varies seasonally. According to the Alaska Department of Fish and Game (Seits et al. n.d.), in 1990-91 there were 103 year-round households in Whittier. Males comprised 56% and females 43% of the population. The average age was 29 years.

The economy of Whittier is based on shipping, tourism, fishing and city government. Federal, state or local government provided 28% of all employment, followed by services (18%), and agriculture, forestry and commercial fishing (10%) (Seits et al. n.d.). In 1991, 10 Whittier residents fished 16 limited entry permits (Seits et al. n.d.). Of all adults (classified as people 16 years and older), 79% were employed at least a portion of the year, with a mean employment rate of nine months, while 56% worked 12 months out of the year (Seits et al. n.d.).

All subsistence data presented here comes from an unpublished report prepared by the ADF&G for the Forest Service. Research for the report was conducted by ADF&G in 1990-91 using a questionnaire submitted to 56 (out of 103) randomly selected households. The following discussion summarizes the findings of the report. Whittier residents harvested a total of 22,308 pounds of subsistence foods in 1990-91. This averaged 217 pounds per household. Salmon ranked first with 42% of the total harvest. Other fish (e.g., halibut and rockfish) ranked second with 24% and land mammals ranked third with 13% of the harvest. Marine invertebrates comprised 11% of the total harvest.

The Whittier seasonal harvest begins in March and April with crabbing, shrimping, and gathering of other marine invertebrates. In May, residents hunt black bear; and during the summer months they fish for cod, halibut, rockfish, and salmon. The season for hunting Sitka black-tail deer begins in early August and continues through December. Moose hunting begins in late August and ends in early September. During this time, people also hunt birds (Seits et al. n.d.).

In 1990-91, 70% of the estimated population participated in at least one resource harvesting activity while 93% of the households used wild resources. Of those households, 87% received wild resources while 66% gave away wild resources. The most widely shared resources were sockeye and coho salmon followed by non-salmon fish (halibut, rockfish, cod) and big game, primarily moose, but also black bear and deer (Seits et al. n.d.).

The percentage of households using specific resources is as follows (Seits et al. n.d.):

Halibut	74%
Coho salmon	68%
Shrimp	44%
Moose	43%
Sockeye salmon	35%
Red rockfish	34%
Black cod	30%
Tanner crab	27%
Pink salmon	23%

The practice of keeping a part of one's commercial catch for home use or for giving to others was an important source of wild foods for Whittier households (Seits et al. n.d.). Commercial catches were the source of 13 different species of wild resources for a total of 4,671 pounds obtained in this fashion. Over 50% of the sockeye salmon used for subsistence purposes were caught with commercial gear as were 79% of the black cod, 67% of the gray cod, 100% of the ling cod, 39% of the halibut, 61% of the red rockfish, 12% of the octopus and 13% of the shrimp (Seits et al. n.d.).

The salmon catch made up the largest proportion of the Whittier subsistence harvest. Over 75% of Whittier's households used salmon, while 55% attempted to harvest salmon. The per capita harvest of salmon was 33 pounds, representing 42% of the total harvest of wild foods (Seits et al. n.d.). Whittier residents primarily harvested salmon from Passage Canal.

In 1990-91, the residents of Whittier harvested 1,596 salmon or approximately 9,452 pounds. Of these, coho salmon constituted 68% of the total salmon harvest, while sockeye salmon comprised 14%, pink salmon 12%, chum salmon 4% and chinook salmon slightly over 1% (Seits et al. n.d.). Residents of Whittier used three basic types of gear to catch salmon: rod and reel, subsistence methods, and commercial methods. Rod and reel accounted for 69% of the total pounds of salmon harvested, subsistence methods accounted for 14% of the total pounds harvested and commercial gear accounted for 17% of the total pounds harvested (Seits et al. n.d.).

Of other categories of fish, halibut was the most widely used, with over 74% of the households using that fish. Other commonly used fish included red rockfish (34% of households), black cod (30%), gray cod (18%), ling cod (10%) and rainbow trout (nearly 10%) (Seits et al. n.d.). Commercial catches provided 52% of the non-salmon fish harvested for home use in 1990-91. Rod and reel accounted for 40% and subsistence methods accounted for 7% (Seits et al. n.d.).

Marine invertebrates were used by 52% of households. Of the invertebrates most frequently used, shrimp were used by 44% of the households, tanner crab by 27%, Dungeness crab by 9% and razor clams by 9% (Seits et al. n.d.).

Land mammals were used by 56% of the households and ranked third behind salmon and other fish with a per capita harvest of 11 pounds (Seits et al. n.d.). Four moose, equaling six pounds per capita, were harvested in 1990-91 (Seits et al. n.d.). Moose were hunted on Kings Bay at the head of Port Nellie Juan (Seits et al. n.d.).

Sitka black-tailed deer ranked second behind moose with four pounds harvested per capita. Whittier residents harvested 26 deer during the 1990-91 season. 27% of the households used deer though only 6% hunted deer and 5% actually harvested the animals (Seits et al. n.d.). Deer are hunted throughout Prince William Sound.

Black bear ranked third behind moose and deer both in terms of use and harvest. Bear were used by 13% of the households while only 2% hunted and harvested bears. The per capita black bear harvest was one pound (Seits et al. n.d.). Dall sheep were hunted by 2% of Whittier households.

Only 3% of the households sampled used any kind of small game or furbearing animals. An estimated six residents trapped and hunted small game. These residents harvested 23 snowshoe hares, seven tree squirrels, a wolverine, a porcupine and a beaver (Seits et al. n.d.).

Only one Whittier household harvested marine mammals. These were seven harbor seals which comprised 1% of the community's total resource take.

Birds and eggs made up 1% of the total harvest or one pound per capita. Similarly, the harvest of wood was rare in Whittier, with only 3% of the households using and harvesting this resource (Seits et al. n.d.). By contrast, berries were the most widely used resource in Whittier with 75% of the households using berries (Seits et al. n.d.).

In comparing Whittier to Chenega Bay, Tatitlek and Cordova, the three other communities discussed in this report, Whittier ranks fourth in total subsistence harvest. For example, in 1990-91 Whittier residents harvested a total of 79 pounds of subsistence foods per person. By comparison Chenega Bay residents harvested 309 pounds per person in 1984-85 and 374 pounds per person in 1985-86. Tatitlek residents harvested 374 pounds per person in 1987-88 and 644 pound per person in 1988-89. Cordova residents harvested 163 pounds per person in 1985 and 234 pounds per person in 1988.

The range of resources used by Whittier residents was also smaller than the range of resources used in the other three communities. Whittier residents used eight kinds of resources per household, which is similar to the communities of Talkeetna (seven per household) and Trapper Creek (seven per household) or the Kenai Peninsula communities of Kenai (five per household) and Ninilchik (eight per household). In contrast, Tatitlek and Chenega Bay residents utilized between 19 and 22 different kinds of resources per household and Cordova residents used 14 different resources per household.

Whittier was similar to Cordova and Tatitlek in terms of harvest composition. In all three communities salmon were the most heavily harvested resource. Salmon made up 42% of

the total harvest in Whittier, 41% of Tatitlek's harvest and 38% of Cordova's total harvest. In Chenega Bay, however, salmon ranked second behind marine mammals. Seals and sea lions were also important in Tatitlek where they made up 20% of the harvest.

In all communities, coho were the most highly sought species of salmon, followed by sockeye. The methods for catching salmon varied in each community. In Whittier the majority of salmon were caught by rod and reel while in Chenega Bay and Tatitlek commercial fishing gear was the principal method for catching salmon for home use. In Cordova both commercial gear and rod and reel were important methods for catching salmon for home use.

In Whittier, the most highly sought resources were salmon and other fish. Deer and marine mammals, which could be affected by the increased commercial fishing activity from the Main Bay hatchery, play a less significant role. Only 6% of Whittier households hunted deer in 1990-91 and only 5% actually harvested the animals (Seits et al. n.d.). Just one Whittier household harvested marine mammals which comprised 1% of the community's total resource take.

4.0 ENVIRONMENTAL CONSEQUENCES

4.0 ENVIRONMENTAL CONSEQUENCES

This chapter describes the potential consequences of implementing the various alternatives and the cumulative effects of each alternative. The environmental analysis responds to the issues identified in Chapter 1. The issues addressed were identified through a public scoping process (see Chapter 1) and through consultation with various State and Federal agencies.

4.1 THE MAIN BAY ALTERNATIVE (PREFERRED)

4.1.1 Vegetation and Wetlands

Trees, shrubs, and herbaceous vegetation would be selectively removed in the hatchery expansion construction zone and graded areas. Approximately 90 trees greater than 6 inches in diameter would be cleared. Only trees at the construction site and those that pose a safety threat to employees, buildings, and equipment would be removed.

A wetlands survey was completed for this DEIS. Wetlands are present in and around the vicinity of the Main Bay Hatchery wherever the land is level or forms a drainage path (Figure 3-1). The initial plan would likely have impacts to three of the existing drainage courses (Adolfson Assoc. 1991). To reduce these impacts, the initial 35% design plan was altered (SSOE, Inc. 1991). This was done by re-positioning several of the proposed buildings and reducing or changing the shape of the gravel pad footprint.

Though drainage courses were mitigated for, expansion plans would still adversely impact small areas of palustrine emergent wetlands. The following, quoted from Adolfson Assoc., Inc. (1991), describes the wetland impact scenario at the Main Bay Hatchery site (refer to Figure 3-1).

Wetlands B, G, and H would not be directly impacted by the new plans. 100% of wetlands D and E and 40% of wetlands C would be filled to create the proposed hatchery. 38% of wetland F would be filled to build a new bunkhouse. 15% of wetland A would be filled to build a new powerhouse. Total proposed wetlands impacts equal 8,660 square feet (0.20 acre).

The effects from filling the above mentioned wetland areas would be to reduce vicinity wetland values in terms of loss of area, reduction in the capacity for water quality improvement, and food chain support for the wetlands adjacent to the fill areas. Impacts to wildlife resulting from the filling of wetland areas are discussed in Section 4.1.2.

Very little research has been conducted to determine impacts to aquatic vegetation from hatchery effluents in subarctic environments. Effluent discharges at the existing Main Bay Hatchery have not been monitored for their effects to Main Bay aquatic vegetation. Adverse effects have not been observed at the water surface of Main Bay. The Esther Island Hatchery, which discharges approximately twice as much wastewater effluent as an expanded Main Bay Hatchery would, also has not been monitored for effects to aquatic vegetation in Lake Bay.

Consequently, in the absence of marine vegetative studies and based on historical effluent discharges, no additional impacts are expected to aquatic vegetation in Main Bay from expanded hatchery effluent discharges. Adverse effects to marine vegetation have not been observed at the water surface of Lake Bay. The effects of increased effluent discharge into Main Bay on water quality is discussed in Section 4.1.3.

Annually recurring, short-term impacts to marine vegetation beneath new on-site rearing netpens may occur from accumulations of waste food, fecal matter, and dead fry on the bottom. A solids accumulation may temporarily cover plant life, depending on current patterns. This localized effect would be small and would not affect marine productivity.

Small impacts from the deployment and recovery of saltwater netpen anchors would be expected from remote release activities. Impacts would range from damage to plant parts to the incidental uprooting of plants during the deployment and recovery of anchors.

<u>Long-term and Cumulative Impacts</u>

The long-term and cumulative impact to vegetation and wetlands would be the loss of approximately 90 trees greater than six inches in diameter, the loss of a small area of wetlands and alteration of vicinity wetlands value. Long-term and cumulative impacts to marine vegetation from hatchery effluent and wastewater is not clearly understood, but is expected to be small.

4.1.2 Fish and Wildlife

Both permanent and temporary displacement of wildlife, due to habitat loss and noise, occurred at the head of Main Bay in 1980 when the existing hatchery was constructed (Forest Service 1980a). There would be further displacement of on-site wildlife from hatchery expansion and during construction phases due to the permanent loss of 0.19 acres of wetland habitat, development of small areas of upland habitat, the permanent loss of 9000 m^3 of nearshore aquatic habitat from netpen placements, noise and disruption during construction/operation activities.

Approximately 0.19 acres of palustrine emergent wetlands filled under this alternative would deprive waterfowl, shorebirds, and other animals such as furbearers of habitat area. Expansion of facilities on areas other than wetlands would result in small losses of upland habitat. Saltwater netpens, 9000 m^3 in area, would reduce nearshore marine habitat.

Possible effects of construction noise on wildlife include interference with communication resulting in secondary effects on (1) navigation, (2) reproduction potential, (3) maintenance or establishment of contact with other group members, and (4) conveyance of messages such as distress or danger, presence of food and extent of territory (U.S. Army Corps of Engineers 1980). However, the ability to relate noise levels to impacts on marine mammals, birds, and other wildlife in the project area is difficult due to the lack of published data.

A 1992 U.S. Department of Agriculture, Forest Service Report to Congress made the following generalizations of impacts to wildlife from aircraft overflights and noise disturbances:

Mammals

- "Large carnivores cannot be deterred from a food source by loud sounds or by any other nonspecific disturbance; and in fact they rapidly habituate to such disturbances."

- "The degree of response and the rate of habituation in small mammals depends on the sound level and other characteristics of the sound." Small mammals habituate with difficulty to sound levels above 100 decibels.

Birds

- "Birds startle readily in response to close approach by aircraft."

- "Passerines avoid intermittent or unpredictable sources of disturbance more than predictable ones, but return rapidly to feed or roost once the disturbance ceases."

- "Migratory waterfowl respond to disturbances more readily than other species of waterbird."

- "Incubating or brooding waterbirds are more reluctant than passerines to leave their nests and habituate rapidly to nonspecific stimuli."

Fish

- "Fish can habituate to sounds and learn to distinguish harmful from benign noise exposure."

Operations at the proposed expanded hatchery would draw down the water level during some years at Main Lake. The flow of the water into Main River from Main Lake would be reduced by an average of about 25.5 cfs (40 cfs maximum and 6 cfs minimum). Based on historic stream flow and weather information (refer to Table 3-4), an estimated average annual drawdown of 5.7 feet would likely occur. A 25-year maximum drawdown event would be approximately 11.5 feet. Reductions in stream flow downstream would result in reductions in stream habitat for anadromous and resident Dolly Varden and aquatic invertebrates such as aquatic insect larvae during summer and fall.

Planned wastewater discharges into Main Bay during operation would derive from incubation effluent and domestic wastes. Effects of hatchery effluents and domestic wastewater on marine fish and wildlife have not been monitored at either Main Bay or Lake Bay. Visual observations at the water surface have not indicated adverse effects. Additional impacts to fish and wildlife from increased volumes of effluent discharge at an expanded hatchery are not

clearly understood, but are expected to be small. The effects of increased effluent discharge into Main Bay on water quality is discussed in Section 4.1.3.

Additional sockeye salmon production and sockeye salmon returns in Main Bay and at remote-release sites may attract more seals and sea lions, black bears, bald eagles, and gulls to those locations. Some wildlife, including black bears, may be attracted to the facility after expansion as more garbage and fish wastes will be generated. The effect of this attraction is to increase the potential of human and wildlife conflicts. Of greatest concern is the impacts from defense-of-life-and-property (DLP) incidents with black bears.

Short-term annually recurring displacement of off-site wildlife would occur at remote eggtake and remote smolt release locations. Displacement of off-site wildlife would be the result of fixed-wing aircraft noise, eggtake and smolt release activities, as well as activities associated with anchored vessels with affiliated skiff traffic.

Intensified remote eggtake activities would affect area wildlife by slightly increasing the duration of time currently spent collecting eggs at each site. Two rearing pens per remote site, 40'x40'x10' deep, would remove approximately 450 m^3 of marine habitat from natural use for 2-3 weeks. Additionally, fixed-wing aircraft support of activities will have short-term impacts (See above).

The only known endangered or threatened species occurring near the site are humpback and fin whales and sea lions. There would likely be no displacement of these animals near the hatchery since it is located at the head of the bay in relatively shallow water. Barges delivering construction supplies may cause temporary displacement of marine mammals at the mouth of, and/or outside of Main Bay.

<u>Interaction between Wild and Hatchery Stocks</u>:

The issue that enhancement of the hatchery stock of sockeye salmon at the Main Bay Hatchery may have an effect on wild, or naturally occurring, stock (Chapter 2), is addressed in this section.

For the Main Bay alternative there would be an additional 14.9 million sockeye salmon smolts produced, potentially increasing food resource competition between wild and hatchery stocks. To minimize the impact to wild stocks, hatchery-reared sockeye salmon would be released during times of peak zooplankton abundance. These abundances would be determined during bi-weekly sampling surveys at release sites. This release strategy would be designed to increase survival of the hatchery-reared stocks and to reduce competitive interactions between hatchery and wild stocks.

For the returning adults there may also be some interaction impacts. To reduce the potential genetic implications of a mixed stock return, the remote release sites at Nelson Bay, Port Chalmers, Kings Bay, and Barry Arm were chosen, since they contain no wild sockeye salmon stock runs. Main Bay had a very minor run of sockeye salmon, with very few returning

adults reported before the hatchery was converted to sockeye salmon production. This run is expected to be supplanted by the 100,000's of returning hatchery sockeye salmon adults. The timing of the enhanced returns at these sites should not create a mixed stock fishery potentially detrimental to a particular wild stock. Small test fisheries and subsequent evaluations would be established in these areas to obtain information on homing precision, migration patterns, survival rates, and wild stock interception.

Hatchery produced sockeye could dilute locally adapted gene pools of Eshamy Lagoon and Coghill Lake and result in shifts in traits that directly relate to the fitness of these stocks, such as size at maturity, age at maturity, migration or spawning times, or egg emergence times. Such changes could have a bearing on long-term survival of the those stocks, although the short term effects would probably be undetectable. To mitigate the potential long-term impacts, the Coghill and Eshamy remote release sites will use F_1 generation fry (the progeny of wild stock). Supplementation is planned through 1996, after which the lakes are expected to be at carrying capacity. The lakes will thereafter only receive fry from parents spawning in the natal stream.

Long-term and Cumulative Impacts

Long-term and cumulative impacts to marine fish and wildlife from hatchery effluent and wastewater are not clearly understood. There would be no long-term displacement of upland wildlife, although short-duration displacement would likely occur during construction activities, and annual displacement during eggtake operations and at remote release locations.

There may be cumulative impacts due to interaction between wild and hatchery-reared stocks of sockeye salmon. During early marine life stages there may be competition between these stocks for food resources. This would be mitigated by timing the release of hatchery-reared smolt to occur during high zooplankton abundances.

Interaction of wild and hatchery stock may also occur during adult return and commercial fishing activities. At the remote release locations this would be mitigated by utilizing sites with no historic wild stock runs or by using hatchery stocks with different run timing.

There may be wild stocks of several different species that would be intercepted during commercial fishing efforts directed at hatchery stock. Such stocks as pink salmon in the Northwestern District or Pigot Bay chum salmon may be intercepted in the Eshamy fishery. ADF&G manages Prince William Sound for wild stock escapement, consequently when escapement numbers at index streams (streams that are monitored for spawners) are low, the interception fishery is curtailed and the commercial fisheries are restricted to terminal harvest areas which lie outside of wildstock migration corridors. Terminal fisheries allow the harvest to be directed at specific stocks.

The Coghill and Eshamy lakes sockeye salmon rehabilitation projects entail restoration of depressed stocks of sockeye salmon to previous levels of abundance. The Chugach National Forest, Glacier Ranger District and ADF&G are partners in a fertilization project at Coghill Lake to rehabilitate the stock by increasing survivorship of sockeye salmon fry in the lake by

providing nutrients for plankton growth; plankton concentration being a limiting factor to fry and smolt survivorship in the lake. Under the proposed alternative, only F_1 generation Coghill stock sockeye salmon would be released in the Coghill River. These fish, which are progeny of wild stock, would imprint on the river source, and return as adults to spawn in the lake system to assure continuation of the wild stock genetic line. F_1 smolt releases at Coghill River would cease after one life cycle (1996), at which time the system is planned to be rehabilitated. Similar rehabilitation of the Eshamy system is planned by stocking F_1 Eshamy smolts at Eshamy Lagoon through 1996.

The proposed expansion of the Main Bay Hatchery could have cumulative effects independent of the fertilization program. Returns of adult sockeye salmon to the Main Bay Hatchery and remote release locations could result in straying and genetic introgression with wild stocks. In addition, targeted commercial fishing on returning hatchery sockeye salmon could increase interceptions of wild stock. These issues would be addressed during a five year evaluation program under development between PWSAC and ADF&G. Studies would include mark and recovery programs, genetic baseline determinations, genetic marking, fishery interception determination, and others that may be needed to effectively validate the existing program approach and offer new direction to the program to assure protection of the wild stock.

4.1.3 Hydrology and Water Quality

The issue of potential impact to the hydrology of Main Lake and the water quality of Main Bay, is addressed in this section.

It is planned that the expansion of the Main Bay Hatchery would utilize nearby Main Lake as a source of water for hatchery operations as well as for hydroelectric power generation. Annual precipitation is the primary factor influencing the amount of water entering the watershed. As such, lake level and the drawdown potential are linked to precipitation.

A study completed by SSOE, Inc. (1991) using historical Whittier annual precipitation adjusted to Main Bay was designed to calculate the consequences on Main Lake water levels from expansion of the Main Bay Hatchery. After the hatchery began operating, and drawing volumes of its permitted 20 cfs, Main Lake began to experience water level drawdowns. Measurements of Main Lake water levels from 1980 to 1984 ranged from approximately 1.0 foot to 6.6 feet of annual drawdown.

The proposed increased demand of 20 cfs, for an average demand total of 40 cfs, would further contribute to the likelihood of measurable annual lake level drawdown, especially during drier years. It is anticipated that drawdown would occur variably throughout the winter and spring months. If a drawdown event extended well into the spring, to after the melting of the lake ice, suspended sediment loads within the lake could increase somewhat due to wave action on the exposed lake bottom sediments.

Domestic wastewater is currently processed in the "Alaskapak" (Extended Aeration Packaged) facility sewage treatment plant and discharged into Main Bay. Additional domestic

wastewater from the expanded living quarters would be treated in a newly installed septic tank system. It is estimated that approximately 240 gallons per day would be treated in the new system. Adding to the existing discharge of approximately 2,150 gallons per day, the estimated total domestic discharge would be approximately 2,390 gallons per day.

The hatchery incubation and rearing pond water effluent is currently discharged at an average rate of approximately 14.2 cfs, into Main Bay. That volume would approximately double to an average of 28.5 cfs from expansion of the hatchery. The doubling of the hatchery effluent discharge into Main Bay would approximately double the input of chlorine bleach and iodophor into Main Bay. Impacts of these chemicals on the marine environment are not clearly understood; however, based on visual observations at the water surface, they are not expected to be significant. Input of fish waste products from the hatchery would also increase significantly.

The doubling of Main Bay Hatchery effluent discharge would add to the amounts of nitrogen (N) and phosphorous (P) nutrients in Main Bay. The addition of these nutrients to Main Bay may cause species changes in the phytoplankton and periphyton (attached algae)(Forest Service 1980a). Increases in the ratios of nutrients in the marine environment may increase the standing crop of algae which may also effect zooplankton species composition. If these events occur, a "bloom" of algae in Main Bay may result (Forest Service 1980a).

The discharge of wastewater from a fish hatchery in Alaska is regulated by the State of Alaska Department of Environmental Conservation and the US Environmental Protection Agency.

To date there are no records (from either regulatory agency) of algal blooms or any other water quality problems in Main Bay as a result of hatchery operations.

Long-term and Cumulative Impacts

Annual precipitation is the primary factor influencing the amount of water entering the watershed surrounding Main Lake. As such, lake level and the drawdown potential are linked to precipitation. Assuming an average proposed use of 28.5 cfs for hatchery operations, drawdown events would occur during the winter and/or spring months of most years.

No long-term or cumulative impacts are expected on water quality.

4.1.4 Air Quality and Noise

Main Bay is currently not in an air quality non-attainment area. A non-attainment area is an area that does not meet the National Ambient Air quality Standards (NAAQS) set by the Environmental Protection Agency. During the construction phase of expansion, heavy equipment such as bulldozers, loaders, and cranes would be utilized. These pieces of equipment are powered by diesel motors which produce combustion exhaust and sound intensities of 90-100 Db (Bond et al. 1963). The operation of these equipment and vehicles, increased use of diesel-

powered generators and pumps, and rock blasting episodes would cause localized air and noise pollution.

During normal operations of the expanded hatchery, air quality and noise would be incrementally greater to that of existing hatchery operations. Increases in the amount of fixed-wing air traffic and boat traffic, Table 4-1, to and from the area would result in recurring noise and air pollution. Slightly greater volumes of combustible waste from hatchery operations would continue to be incinerated. Debris from construction would be burned on-site. Smoke from these wastes would cause temporary localized air pollution.

Long-term and Cumulative Impacts

Since hydroelectric generation will be the primary source of power under the Main Bay alternative, there would be no anticipated long-term or cumulative air quality or noise impacts.

4.1.5 Wilderness

The issue concerning the effect of the proposed development on the wilderness character of the Nellie Juan-College Fiord Wilderness Study Area, as outlined in Chapter 1, is addressed in this section. The Main Bay Hatchery, located in this Wilderness Study Area, is currently operating under a Forest Service Special Use Permit. Any new development at this site would require an amendment to that permit.

Though the Forest Service has not recommended the area around the Main Bay Hatchery for wilderness designation, the area is still governed by the provisions of the Wilderness Act and ANILCA until Congress makes a decision to designate the area as wilderness or release it from further study. Expansion of the existing facilities would result in a small, incremental impact to the overall natural character of the Nellie Juan-College Fiord Wilderness Study Area.

The Main Bay Hatchery, the proposed eggtake sites at Coghill and Eshamy Lakes, and the fry/smolt release sites at Coghill and Eshamy Lakes, Main Bay, Kings Bay, and Barry Arm are all in the Wilderness Study Area. Coghill Lake, Barry Arm, and Kings Bay are within the Forest Plan recommended wilderness area. The proposed eggtake site at Eyak Lake and the remote-release sites at Nelson Bay and Port Chalmers are outside the Wilderness Study Area.

Because of the presence of the existing facilities, the addition of new buildings, roads, and the pipeline would likely not further impair the potential for wilderness designation of adjacent lands. The facilities expansion would occur within the current use area under the Special Use Permit issued for the existing facilities.

TABLE 4-1
MAIN BAY BOAT AND PLANE TRAFFIC

Month	Existing		Expanded	
	Boat	Plane	Boat	Plane
January	3	1	4	2
February	3	2	5	3
March	3	1	5	1
April	4	2	4	3
May	3	3	6	3
June	3	8	6	7
July	3	5	4	7
August	3	8	5	12
September	3	2	5	1
October	3	7	5	10
November	4	2	5	2
December	2	1	3	2

Noise and activity associated with construction of the new facilities would temporarily increase the intrusion on the wilderness values. During construction, opportunities for solitude would be diminished in a slightly larger portion of the surrounding area due to the increased noise levèls from construction equipment and increased aircraft and boat traffic in Main Bay. Construction activities would directly influence the wilderness experience sought by users of nearby shoreline areas, resulting in their experience being substantially degraded. In addition, the opportunities for primitive recreation experience may be reduced in the area surrounding the facilities because of the increased number of workers in the area and the noise from construction activities and hatchery operations. However, the existing hatchery and its operation already affects wilderness character at this location, and wilderness solitude seekers may already avoid the area. In this case, the incremental increase in activity may represent a very small impact.

The presence of new structures may be evident in the area immediately surrounding the facilities which would further degrade the apparent naturalness of the area. Though largely screened by landforms and vegetation, the presence of new structures would degrade the primitive recreation experience sought by backcountry users of shoreline areas in Main Bay. To minimize the effects of the facilities on the apparent naturalness, the use of construction materials with colors and textures that blend with the natural character of the surrounding area are recommended as mitigation. This would make the facilities less evident to backcountry users. Lake drawdown from December to May, as well as diminished flows in Main River, could detract from the wilderness character of the area. However, much of this drawdown will be in winter, and would be difficult to detect visually. The effects of the hatchery itself on wilderness character will probably small and insignificant.

In areas proposed for eggtakes, opportunities for solitude would be diminished occasionally by the sights and sounds of boats or floatplanes that perform this activity. It is anticipated that eggtakes in the WSA would occur during mid-August in the Coghill system and during early October in the Eshamy system. These activities are not expected to affect the apparent naturalness or natural integrity of these off-site areas.

Remote releases would occur in early spring as soon as the lake ice melts in Coghill and Eshamy lakes. Opportunities for solitude for primitive recreation experiences would be temporarily disrupted in the vicinity of these off-site areas by floatplanes when these activities occur. Other remote-release locations in Barry Arm and Kings Bay would be affected for a few weeks by the netpens and tending boats used for "imprinting" of the juvenile fish. During this time, the opportunities for solitude and a primitive recreation experience would be compromised in the immediate vicinity of the release sites.

The harvesting of fish at the return sites will bring a lot of boats into a relatively small area of the WSA at each site for the period of time required to harvest the fish. At Main Bay, Coghill, and Eshamy, this will be an addition to an already existing fishery, which will probably have the effect of making the fishing busier, but may not increase the number of boats or the length of time substantially. At the Kings Bay and Barry Arm sites, 100 to 250 boats would be expected in the commercial fishery. The fishing would be continuous for few weeks that the fish are available (sometime between June and August, depending on the stocks and the run timing.

During this time, the opportunity for solitude, inspiration, and a primitive recreation experience would be disrupted substantially.

Long-term and Cumulative Impacts

The presence of new structures and pipelines associated with facility expansion may further degrade the naturalness and wilderness character of the area at the head of Main Bay. Though largely screened by landforms and vegetation, the new structures would tend to degrade the primitive experience of recreational users of Main Bay. Since there is an existing hatchery with buildings and activities, the additional increment would add no new effects and would be a minor effect.

Eggtaking operations are occurring at Coghill and Eshamy Lake systems to supply eggs for the existing production of sockeyes at the Main Bay hatchery. The proposed expansion would more than double the needed eggtake, but the activities would be similar, including daily transport of six to seven people to and from the sites by float plane for one to three weeks.

The Coghill Lake Fertilization Project, including releases of Main Bay Hatchery sockeye smolts through 1996, is an existing but separate activity. It will result in an increase of fishing pressure for the returning salmon, which will have an effect on the opportunity for solitude, inspiration, and primitive recreation experiences. The proposed expansion of the Main Bay Hatchery will add to the fishing intensity.

4.1.6 Visual

Viewers Impacts

The placement of structures in the natural landscape typically results in strong visual contrasts. However, because the new hatchery building and support structures would be constructed adjacent to existing structures, weak to moderate visual contrasts are expected to result. Views from Main Bay are largely screened by a large tree-covered rock outcrop. The new hatchery building would likely be entirely screened to views from Main Bay, except from the extreme head of the bay adjacent to the existing facilities. The new bunkhouse and warehouse would be situated behind the existing hatchery building and would be partially to fully screened to views from Main Bay. Because so little of the area is visible, the visual contrasts from the construction activities and new structures would result in low to moderate impacts to foreground views from boaters and other recreation users in Main Bay.

The construction activities associated with the new water pipeline from Main Lake to the new hatchery building would result in moderate to strong contrasts in the lake area. During construction, which is expected to last two years, these contrasts would result in a low to moderate impact to views from occasional backcountry users in the Main Lake area. Subsequent to the construction phase the visual impacts would likely be small since the additional pipeline would parallel the existing one and no new pad or corridor would be cleared.

Construction materials to be used in the expansion would be of the same color, brown and brown-tones, and texture as that of the existing facilities. This would reduce visual contrasts associated with new facilities. In addition, the placement of structures on the site to take greatest advantage of potential screening by landforms and vegetation would also minimize visual contrasts.

Compliance with VQOs

The expansion of facilities at Main Bay Hatchery would result in some moderate visual contrasts. However, the site is somewhat screened to sensitive views from Main Bay by tree cover and rock outcrops and the casual observer would notice only small changes in the existing landscape. These visual contrasts would be evident, but would be visually subordinate in the characteristic landscape. With careful construction, minimizing the removal of trees, and the use of compatible colors and textures in construction materials, the proposed expansion of the Main Bay Hatchery would comply with the VQO of Partial Retention.

<u>Long-term and Cumulative Impacts</u>

The long-term and cumulative impacts of hatchery expansion would be the visual contrasts associated with additional permanent structures built and the new water pipeline.

4.1.7 Cultural and Historic Resources

No archeological materials were located during a spring 1978 Forest Service survey nor during the construction of the existing hatchery. In the event that archeological or historic resources are discovered during developmental activities, all operations would cease and the Forest Service archeologist and the State Historic Preservation Office would be notified immediately. The site would be treated in accordance with the requirements of the National Historic Preservation Act of 1966, Executive Order 11593 of 1971, and 36 CFR 800, the procedures for the Protection of Historic and Cultural Properties.

4.1.8 Land Use, Ownership, and Management

4.1.8.1 Land Use

The proposed alternative at Main Bay would result in a moderate expansion of existing land and water uses. Construction activities, which would last approximately two years, would occur within the current boundaries of the existing hatchery site and would result in temporarily higher levels of noise (Section 4.1.4) and other construction associated activity. The level of hatchery and support uses would increase, although the timing and duration would be similar to existing activities. Water uses would also increase, primarily associated with cost recovery fishing by PWSAC and setnet fishing to harvest the additional fish available. No increases in the number of setnet fishermen are anticipated because the quota of Limited Entry setnet permits for the area has been filled. The Forest Service has also limited the number of upland setnet

support facilities to thirty, therefore no additional permits would be issued. Since the same stocks of fish will be used, there should be no increase in the length of the setnet fishing season.

The proposed project would result in an increase in land and water uses associated with both remote eggtake and smolt/fry release operations. Activities at the eggtake locations at Eyak, Eshamy, and Coghill would probably occur in conjunction with existing eggtake efforts. This would include fixed-wing aircraft access to the sites, with the duration of activity lasting up to several weeks.

Remote fry/smolt release operations would constitute new land and water uses at the six potential remote release sites. Activities would include deployment of rearing pens in saltwater areas for a period of up to six weeks during May-June. At the end of release operations, pen facilities would be removed. Facilities would not be permanent, but would constitute a moderate temporary impact, with potential use conflicts with recreation uses. Potential impacts include visual and noise intrusion, decrease in the quality of the experience, and increased risk of collisions. Impacts would be potentially greater in areas with little existing fishing and boat use, such as Kings Bay, or in areas with higher kayak or tour boat traffic, such as Barry Arm.

A third category of potential off-site water use impact is the introduction of additional commercial fishing periods at the remote release sites to harvest returning hatchery stock. In some cases, such as Coghill, Eshamy, and Port Chalmers, commercial fishing for other stock already occurs, and the effect of the proposed action would be to extend the period of fishing activity with earlier openings to harvest returning sockeye salmon. Patterns of water use would change to include Nelson Bay, Kings Bay, and Barry Arm (currently, the lack of any appreciable natural return limits fishing activity). Close to Cordova, Nelson Bay probably receives boat traffic, and there would be additional water use impacts from introduction of a fishery at that location. Kings Bay is located within the Nellie Juan-College Fiord Wilderness Study Area; introduction of a fishery would constitute a new intense but short term water use. To other boat users in the remote area during this period, impacts would be in June, July or August.

4.1.8.2 Land Ownership

The proposed alternative would not result in any land ownership impacts at the Main Bay Hatchery site. The hatchery development would be conducted within the confines of the existing Special Use Permit area.

The proposed project would not result in any changes in land ownership. For the potential remote release sites and eggtake activities, appropriate State and Federal permits would be required.

4.1.8.3 Land Management

The existing hatchery is located in an area of Chugach National Forest identified as a Wilderness Study Area; permanent facilities and improvements associated with a fish hatchery are an allowed use. The proposed project would increase land and water management impacts

due to increased construction activities which would last approximately two years. Management impacts subsequent to construction activities would likely be minimal since the number of commercial fishing permits will remain the same, however the number of commercial openings and duration of the fishery may be extended to harvest the additional hatchery returns.

The proposed project would not result in land management impacts associated with the remote eggtake sites. These areas are currently being used and the number of personnel involved and the timing would not change. There would, however, likely be increased fixed-wing flights required to move additional eggs.

The significance of land management impacts would vary depending on the location of the remote release operation. As with land use impacts, in areas such as Coghill, Eshamy, and Port Chalmers where commercial fishing for other stocks already occurs, the effect of the proposed action would be to extend the period of fishing activity with earlier openings to harvest returning sockeye salmon, and may create small changes in management. The same is probably true for Nelson Bay, due to its proximity to Cordova. Kings Bay is located within the Nellie Juan-College Fiord Wilderness Study Area Chugach National Forest; the introduction of a new use (remote release and terminal fishery) will add additional human use to the Wilderness Study Area. Similarly, the increasing popularity of Barry Arm for recreation boats, tour boats and kayaks and potential for conflict with remote release and a terminal fishery could also conflict with current State and Federal land management objectives for the area.

Long-term and Cumulative Impacts

There would be some potential cumulative impacts on land uses and management. Location of remote release and terminal fishery sites in Barry Arm would add to the recreational vessel use of the area and could create use conflicts. The same would be true to a lesser degree for use in the Coghill remote release area, which has an existing commercial fishery as well as extensive recreation and tourism vessel use. In Kings Bay, there is currently no commercial fishery but there is use by recreation and tourism vessels. Creation of a remote release and terminal fishery site could require additional management to respond to potential use conflicts between sport fishing and other water-based recreation.

4.1.9 Socio-economics (non-fisheries)

Potential socio-economic impacts would be created by several aspects of the proposed hatchery expansion and associated activities. These include temporary and permanent employment and wages created by project construction and operation, which would in turn affect the population at the hatchery site. Project expenditures associated with construction and operation would affect the local economy to some degree, through purchase and transport of supplies. Additional demands may be placed on hatchery site and community facilities and services through increased population and fish rearing demands on-site, and off-site fish processing and employment created by the project. Public revenues would be increased by the sale of additional fish harvested and processed; public expenditures could be affected indirectly by the project through the need to provide additional public services.

4.1.9.1 Employment and Income Characteristics

Construction of the proposed Main Bay fish hatchery expansion would create a certain number of temporary construction jobs. These jobs would be located at the hatchery site and are likely to last 20-24 months in duration. It is estimated that construction would utilize an average of a 20 person workforce and that construction wages would total $3,729,984 over the two years of construction work.

Operation of the proposed Main Bay fish hatchery expansion would create one additional permanent operation job. This job would be located at the hatchery site. No specific calculations of wages created by the project have been made at this time; however, estimates can be made using the current wage rates of hatchery employees. Using the current annual payroll for five permanent employees at the Main Bay Hatchery ($183,705 paid annually), average annual payroll per employee is $36,741. The additional permanent employee would create an annual payroll of $36,741.

The proposed project would result in an increase in activities associated with both remote eggtake and smolt/fry release operations. Up to two additional temporary employees would be needed, and would be at the hatchery site. Employees would be at the remote release sites for up to three weeks; employees would be participating in the eggtake activities for several weeks. Using the current annual payroll for 10 temporary employees at the Main Bay Hatchery ($92,324 paid annually), average annual payroll per employee is $9,232. An additional two temporary employees would create an additional annual payroll of $18,464.

4.1.9.2 Population Characteristics

Construction of the proposed Main Bay fish hatchery expansion would result in a temporary population increase of up to 20 associated with construction jobs. This population increase would occur at the hatchery site, and would last an estimated 20-24 months.

Operation of the proposed Main Bay fish hatchery expansion would result in a permanent population increase of one associated with hatchery operation. This increase would occur on-site. Currently, there is an average of one dependent per employee on site; therefore the total permanent population increase at the hatchery would be two. Additional temporary employees would increase the population at the hatchery site to two during the months of June and July. Temporary population increases would occur at the smolt/fry remote release sites. Up to two personnel would be located in temporary housing. Potential remote release sites include Nelson Bay, Port Chalmers, Kings Bay, Barry Arm, Coghill, and Eshamy Lagoon. No population increases in surrounding communities attributable to the proposed project are anticipated.

4.1.9.3 Local Economy

The proposed hatchery expansion would have a positive effect on the economies of several local communities. Some portion of construction wages would be spent in local communities contributing to the local economy; construction wages are estimated at $3,729,984.

Construction may also result in the purchase of supplies locally, and may require local transportation services to bring materials to the construction site. Construction expenditures are estimated at $5.9 million for Phase 1 and $14.1 million for Phase 2.

Similar to construction, a portion of permanent and temporary hatchery operations wages are likely to be spent in local communities; increased permanent gross wages are estimated at $36,741 annually. Local purchase and transport of supplies would also occur. In addition, the creation of $18.5 million annually in additional fish harvesting gross income, and $12.4 million annually in fish processing gross income from expanded production would also increase benefits to those communities where boats are based and processing occurs. Communities most likely to see these impacts are Cordova, Valdez and Whittier; Seward, Tatitlek, and Chenega Bay would be affected to a lesser extent.

4.1.9.4 Public Finances

The proposed expansion of the Main Bay Hatchery would increase State and local revenues, primarily through annual tax revenue created by the sale of raw and processed fish. The State of Alaska charges a 3% raw fish tax on all commercial fish delivered to shore-based processors, which includes nearly all salmon. Assuming an estimated raw fish cost (price to fishermen) of $18.5 million, the annual raw fish tax on Main Bay Hatchery expansion fish would be approximately $560,000. Approximately half of this tax revenue would be returned to the affected communities on the basis of fish landed in the community. Additional revenues would be created through collection of sales tax on purchases using income generated by project employment, fish harvest, and processing income.

Public expenditures would occur in two potential areas: additional fishery management effort associated with monitoring harvest of increased production, and provision of additional water, sewer, and electricity to fish processors. It is likely that existing ADF&G staff would be utilized for fisheries management.

<u>Long-term and Cumulative Impacts</u>

Expansion at the Main Bay facility would add an estimated $18.5 million to the commercial fishing industry and $12.4 million to the fish processing industry.

Production of relatively high value sockeye salmon would create additional employment and income in an area where uncertain fish returns and prices have caused economic hardships in recent years. Additional production for commercial fish processors would create additional wages, increase the economic viability of fish processors, and create additional tax revenue for State and local governments.

4.1.10 Commercial Fisheries

The issue concerning the impacts of increased production of sockeye salmon at the Main Bay Hatchery to the commercial fishing industry in Prince William Sound and on the processing of fish (Chapter 2), is addressed in this section.

The commercial fishing industry within Prince William Sound would be the primary beneficiary of the project. The following assumptions have been made in the analysis: a) 100 percent of the returning adult sockeye salmon would be harvested, and 2) that all of the harvest would be taken by commercial, subsistence, and sports fisheries; and by the hatchery operator for cost recovery and brood stock.

4.1.10.1 Biology/Management

Expansion of the Main Bay facility would result in an increase in the production of sockeye salmon smolt and returning adults. The proposed plan calls for the production of 20 million smolt according to the schedule in Table 4-2. This production would yield a return of approximately 4 million adults according to the schedule in Table 4-3. These returning adult salmon would be made available to the common property fisheries of western Prince William Sound.

The Prince William Sound commercial fishery is managed according to a management plan that was approved in February 1991, which provides management biologists guidelines to allocate enhanced fish runs among the different gear types: drift gillnet fishermen, set gillnet fishermen, and seine fishermen. The management plan is provided in 5 AAC 24.2, Prince William Sound Management and Salmon Enhancement Allocation Plan.

The intended allocation of benefits from the proposed project were established to be consistent with this plan. The plan recognized that up to 90 percent of the commercial harvest in Prince William Sound is provided by hatchery production. The Prince William Sound hatchery programs have been very successful, but the cost of that success has been to alter historic fisheries to avoid over-harvest of wild stocks of salmon while still providing for an opportunity to harvest large hatchery returns. The PWS Management and Salmon Enhancement Allocation plan provides guidelines to help resolve gear conflicts as fishermen attempt too maximize harvests in terminal areas.

The guidelines of the plan provide the following objectives:

1) minimize impacts on wild stocks,

2) minimize impacts to historic and traditional fisheries while maintaining historic harvest value percentages,

TABLE 4-2

Main Bay Hatchery
Smolt Production Schedule

Release Year	Stock Release Schedule							Total
	Eyak	Coghill		Sites to be Determined including Coghill and/or Main Bay	Eshamy		Sites to be Determine d including Eshamy	
	Main Bay	Coghill	Main Bay		Eshamy	Main Bay		
1988	0	330,025	0	0	0	0	0	330,025
1989	0	3,923,829	0	0	0	0	0	3,923,829
1990	0	2,696,498	0	0	845,000	872,000	0	4,413,496
1991	45,000	1,550,000	411,000	0	1,200,000	1,400,000	0	4,606,000
1992	70,500	870,000	780,000	0	722,320	722,320	0	3,185,140
1993	70,500	870,000	1,805,800	935,000	722,320	722,320	0	5,126,940
1994	70,500	870,000	1,805,800	935,000	722,320	1,245,400	523,080	6,172,100
1995	70,500	870,000	1,805,800	935,000	722,320	1,245,400	523,080	6,172,100
1996	*	870,000	1,805,800	935,000	722,320	2,500,000	1,777,880	8,610,800
1997	4,545,000	**	5,000,000	5,000,000	0	2,500,000	2,500,000	19,545,000
1998	5,000,000	**	5,000,000	5,000,000	0	2,500,000	2,500,000	20,000,000
1999	5,000,000	**	5,000,000	5,000,000	0	2,500,000	2,500,000	20,000,000
2000	5,000,000	**	5,000,000	5,000,000	0	2,500,000	2,500,000	20,000,000

Assume: First phase construction complete in 1994
Second phase construction complete in 1995
* Brood year 1990-1994 Eyak sockeye released as 0+ smolts. Brood year 1995-2000 Eyak sockeye released as 1+ smolts, consequently no releases of Eyak Stock will occur during 1996.
** Smolt releases may continue at Coghill and Eshamy based on success or failure of wildstocks.

TABLE 4-3

Main Bay Hatchery
Adult Sockeye Production Summary
Expanded Hatchery

Location	Return Year									
	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001
Main Bay Hatchery										
Pink	527,800									
Coghill Sockeye	745,546	491,305	289,600	202,074	361,160	361,160	367,295	491,751	1,000,000	1,000,000
Eshamy Sockeye	0	152,100	232,900	154,018	144,464	144,464	238,618	474,908	500,000	500,000
Eyak Sockeye	0	495	4,646	6,974	7,050	7,050	106,261	891,925	997,269	1,000,000
Coghill District										
Coghill Sockeye	0	12,330	93,270	186,774	361,160	361,160*	367,295*	491,751*	1,000,000*	1,000,000*
Eshamy District										
Eshamy Sockeye	0	156,960	269,440	158,018	144,464	144,464*	238,618*	474,908*	500,000*	500,000*
Total Sockeye	745,546	813,190	889,856	707,857	1,018,298	1,018,298	1,318,088	2,825,243	3,997,269	4,000,000

Assume: First phase construction complete in 1994.
Second phase construction complete after 1995.
* Smolt release for Coghill and Eshamy Lake rehabilitation projects may be discontinued based on success of rehabilitating wildstock. These fish would be released in other approved sites based on biological, genetic, and management concerns.

3) promote the highest possible quality fish,

4) reduce congestion in the fisheries and,

5) maintain the diversity of uses of the salmon resources in Prince William Sound, including subsistence, sport and personal use.

Minimizing impacts to wild stocks of sockeye salmon is an important management objective. This is particularly important in the case where wild stocks are at depressed levels. If the ADF&G managers have concerns for wild stocks, large, area-wide open fisheries are reduced in favor of more restricted subdistrict openings closer to the terminal areas.

An initial specification considered for the Main Bay hatchery called for substantial remote releases at the Coghill and Eshamy sites. During the course of preparation of this Draft EIS, biologists with ADF&G determined that the original release plan would probably conflict with management concerns over low abundance of wild sockeye salmon runs at these locations. Pending further investigations, it is not certain which of the six proposed release sites would be utilized; however, there are several assumptions that form the basis for identification of benefits.

These assumptions are:

1. The numbers of sockeye salmon returning from each stock utilized would be:

Year	Existing Production	Expanded Production	Total
1998	1,018,298	299,798	1,318,087
1999	1,018,298	1,806,945	2,825,243
2000	1,018,298	2,978,971	3,997,269
2001	1,018,298	2,981,702	4,000,000

2. The total number of smolt and returning adult sockeye salmon would be equally split between the Main Bay hatchery site and the remote release sites selected. Eyak stocks would only be utilized at the Main Bay site, due to concerns over interceptions in the Copper River and other early commercial fisheries.

3. PWSAC would be allocated 30 percent of the returning adult sockeye salmon for cost recovery and brood stock. It is likely that most of the cost recovery would occur at the Main Bay hatchery site. If cost recovery is to take a share of the returning sockeye salmon from the remote release site(s), a special harvest area (SHA) would need to be designated. This designation would require action from the Alaska Board of Fisheries.

4. As the results of annual harvest data accumulates, a realistic picture of gear type harvest percentages would become apparent. Adjustments in production/release, or management strategies would be recommended to reflect fair and equitable allocations as established in the regional allocation policy.

A schematic chart of the proposed alternative is shown in Figure 4-1. This chart diagrams the numbers of returning adult sockeye salmon by stock, the distribution of Main Bay releases and remote releases, the allocation among the different types and the allocation to PWSAC for corporate cost recovery. It also lists the six potential remote release sites which have been identified.

Table 4-4 shows the projected timing and projected distribution of fishing effort for the Main Bay releases and remote release at Coghill and Eshamy. Potential fishing distribution for other remote releases would be discussed briefly below.

The stocks to be utilized in the program are separated in timing of return. The Eyak stock would return early, with a run timing of May 15 to June 30. The Coghill stock would return in the middle of the fishing season, from June 15 to August 1. The Eshamy stocks would return toward the end of the fishing season, from July 15 to September 1. Eyak stocks would not be utilized in remote release programs due to considerations for interceptions of wild stocks.

Barry Arm (Port Wells): This area is currently managed for drift gillnet fishing from July 21 through August 25. After August 25, it is open to seine fishing. If this area were utilized as a remote release site, it is likely that the majority of the harvest would accrue to the drift gillnet fishermen. Test fishing investigations would be necessary to evaluate interception rates based on location of the fishery. The physical conditions of the site, i.e. shallow water depth across the head of the arm, may be important in determining viability of this site. The likelihood of harvest by the set gillnet fishery for fish bound to this site are uncertain, although they would probably be relatively modest. Set gillnet fishing currently is not allowed in this district.

Port Chalmers (Montague Island): This area is currently managed as a seine fishery. Under the current management regime, this area is not open to either drift gillnet or set gillnet gear. To allow harvest by the drift gillnet fleet (which is allocated approximately 50 percent of the enhanced Main Bay sockeye salmon harvest), a new harvest area would need to be defined by the Alaska Board of Fisheries. Under existing fishing patterns, interceptions of sockeye salmon bound for this site by the set gillnet fishermen operating in the Eshamy district would be minor. A drift gillnet or a combined drift gillnet/seine fishery would probably operate in a terminal area toward the head of the bay.

Nelson Bay (Eastern District): This area is currently managed as a seine fishery. A new harvest area would need to be established by the Alaska Board of Fisheries to provide for a new drift gillnet fishery.

Kings Bay (Port Nellie Juan): This area is currently managed as a seine fishery. A new harvest area would need to be established by the Alaska Board of Fisheries to allow drift gillnet fishermen to participate in harvest of fish returning to this site.

Main Bay Alternate Release Plan

Distribution of Returning Adult Sockeye

EYAK STOCK	COGHILL STOCK	ESHAMY STOCK
922,950 Sockeye	1,277,680 Sockeye	711,072 Sockeye

Total of 2,981,702 Adult Sockeye Returning Annually
1,490,851 from Main Bay Releases | 1,490,851 from Remote Releases

2,087,191 Sockeye to the Common Property Commercial Fishery
596,340 from Main Bay Releases | 1,490,851 from Remote Releases *

Drift Gillnet: 1,440,527

Set Gillnet: 321,636

Seine: 325,028

894,511 Sockeye for Cost Recovery to Hatchery
All from Main Bay Releases

* Remote Sites Include:

1. Coghill Lake/River system
2. Eshamy Lake/River system
3. Barry Arm
4. Port Chalmers
5. Nelson Bay
6. Kings Bay

Assumption: There may need to be adjustments in numbers and locations of remote releases, and in management strategies to maintain the set net fishery benefit within historic proportions thus allowing a fair and equitable allocation between gear types.

Figure 4-1

TABLE 4-4

Timing and Distribution of Commercial Fishing Effort on Main Bay Enhanced Sockeye Runs

I. Eyak Stock • Run timing from May 15 - June 30, with peak from May 20-June 1 • Few other fish present at this time in the vicinity of the Main Bay Hatchery, therefore few problems with interceptions of other stocks	**Harvest Areas** • Harvested by drift gillnet and set gillnet in directed fishery in the Eshamy District
II. Coghill Stock • Run timing June 15 - August 1, with peak from July 1 - July 10 • Impact on non-target runs during peak should be minimal, with possible exception of wild Coghill Lake sockeye	**Harvest Areas** (a) Main Bay releases • Harvested in Eshamy District by the drift gillnet and set gillnet fisheries • Harvested in the Southwest District by the seine fleet (b) Coghill releases • Harvested in Eshamy District and Coghill District by drift gillnet fleet • Harvested in Eshamy District by set gillnet fishermen • Harvested in the Southwest District by seine fishermen
III. Eshamy Stock • Run timing July 15 - September 1, with peak from August 10-20 • Returns to Main Bay and Eshamy Lake would be dependent on interceptions by the seine fleet in the Southwest and Northwest Districts	**Harvest Areas** • Harvested in Eshamy District by drift gillnet and set gillnet fisheries • Harvested in Southwest District by seine fleet

Source: Information provided by PWSAC and ADF&G.

Successful completion of the Main Bay Hatchery expansion would include evaluation of the available remote release sites. Currently, several of these sites are designated for exclusive use by one or more gear types. In order to mitigate some of the allocation problems associated with commercial harvests at these remote release sites, it would be necessary for PWSAC, fishermen, and the Regional Planning Team to work together to develop proposed regulation changes for approval by the Alaska Board of Fisheries. To achieve equitable allocation of benefits, some adjustments in time/area closures as well as hatchery management of smolt remote release would be necessary.

4.1.10.2 Economics

Once the project achieves full production in 2001, there would be an annual increase of approximately 2.9 million sockeye salmon to the different gear types and to PWSAC for cost recovery.

Although this increase is a large change for sockeye salmon production in Prince William Sound, it would be a relatively modest share of overall sockeye salmon harvest in Alaska. Prince William Sound accounts for approximately four percent of total Alaskan production of sockeye salmon. Bristol Bay was the major producing area, with 56 percent of total landings. Total production in 1991 was 45.5 million sockeye salmon (ADF&G 1992). If all other sockeye salmon producing regions remained constant, the full production level of four million sockeye salmon from the Main Bay Hatchery expansion would add approximately 6.6 percent to the total Alaskan sockeye salmon harvest.

Figure 4-2 shows the relative distribution of annual benefits that would accrue to each fishing group, for the Main Bay alternative compared with the Esther Island alternative. The annual gross benefits for the Main Bay alternative shown in this figure total $26.3 million per year. The assumptions utilized in calculation of annual gross benefits are a factor of 6.1 pounds per sockeye salmon (the average fish weight of the 1991 run) and a price of $1.45 per pound, which is a simple average of the last 10 years.

Regarding the price assumption, there could be a wide variety of methods and assumptions utilized, other than the 10-year simple average utilized. However, any method of price projection is subject to error. The average selected provides a conservative estimate of projected future economic benefits, and should be suitable for planning purposes.

Previous research, (e.g., Boyce 1990) indicates a price-quantity relationship for Alaskan salmon, including sockeye. This research indicated that price variation is difficult to attribute to projected production levels, and that other factors, such as natural variation and changes in the structure of the market are likely to be much more pervasive influences on future market prices.

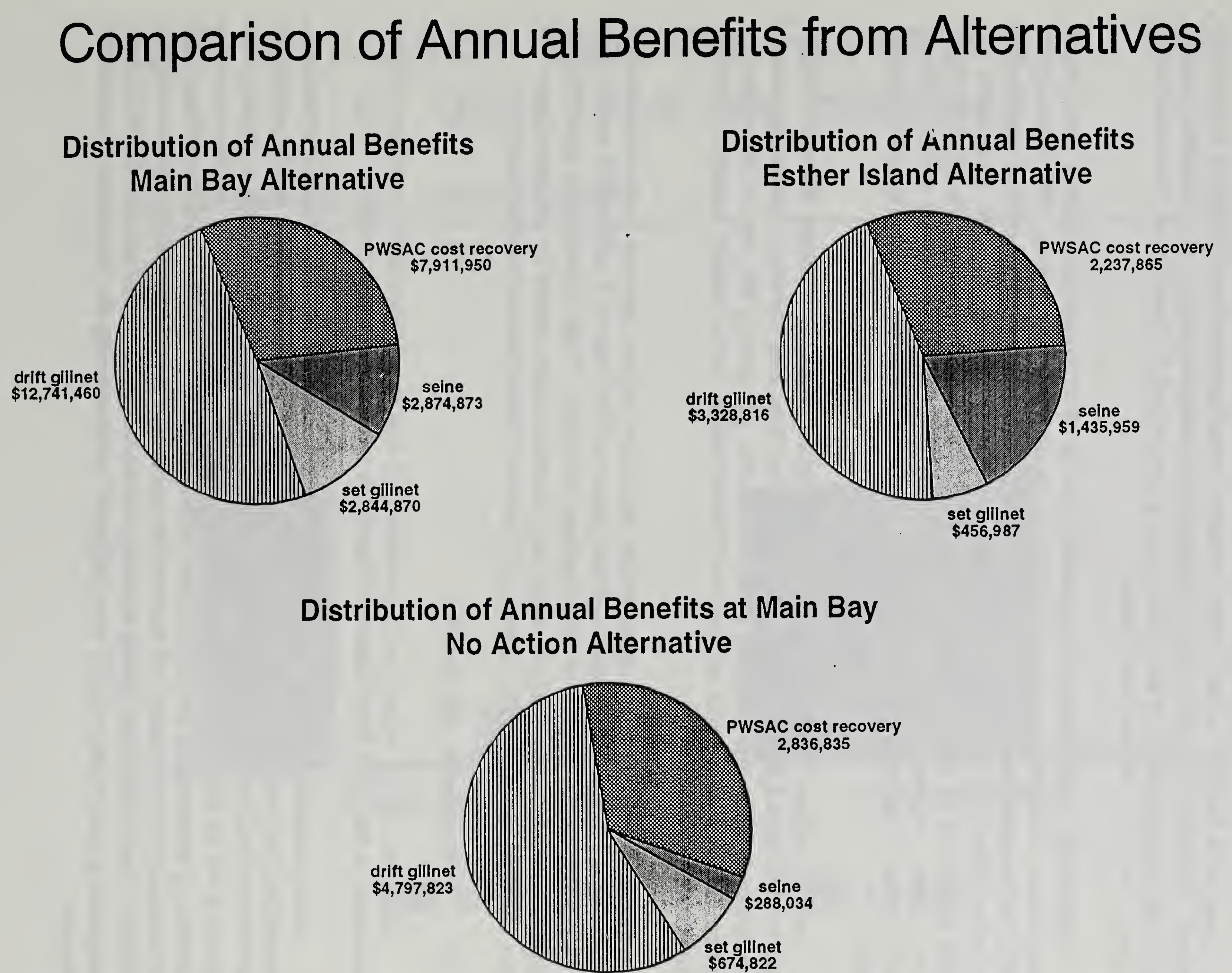

Comparison of Annual Benefits from Alternatives
Distribution of Annual Benefits
Main Bay Alternative
PWSAC cost recovery
$7,911,950
drift gillnet
$12,741,460
seine
$2,874,873
set gillnet
$2,844,870
Distribution of Annual Benefits
Esther Island Alternative
PWSAC cost recovery
2,237,865
drift gillnet
$3,328,816
seine
$1,435,959
set gillnet
$456,987
Distribution of Annual Benefits at Main Bay
No Action Alternative
PWSAC cost recovery
2,836,835
drift gillnet
$4,797,823
seine
$288,034
set gillnet
$674,822

Figure 4-2

Long-term and Cumulative Impacts

Long-term impacts to the fishing industry would include direct financial benefits to fishermen, processing companies, and communities as described above. An additional impact would be the diversification of the fishery among species and the creation of a more equitable allocation of resources among user groups.

Historically, pink salmon have provided the bulk of the commercial harvest from Prince William Sound. Pink salmon prices have declined drastically from a peak in 1988, reducing the overall contribution of that species to overall revenues. In recent years, the relative contribution from sockeye salmon harvests has become increasingly important to fishermen, particularly for the drift gillnet and set gillnet groups. Figure 4-3 shows the relative contribution in 1991 from sockeye salmon compared to other species of salmon. These data indicate that sockeye salmon provide income for all three gear types, but is particularly important for the drift and set gillnet fisheries.

Sockeye salmon traditionally command the highest prices and strongest demand of all the salmon species (with a few exceptions such as Yukon River king salmon). Increasing sockeye salmon production by approximately three million fish per year in the case of the Main Bay alternative would tend to add stability and diversification to the fishing industry in Prince William Sound.

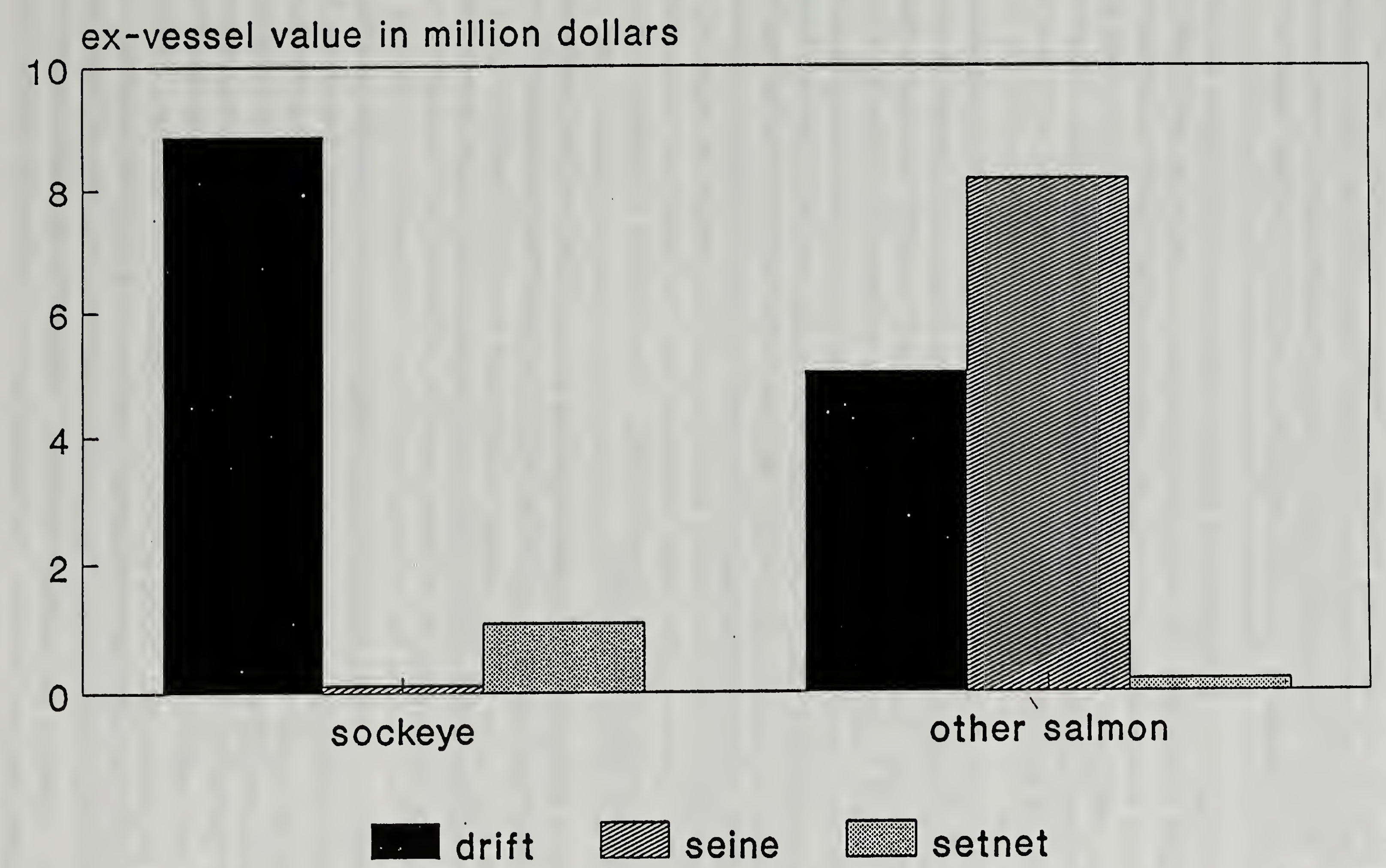
The long-term impact of expansion on the sockeye salmon industry in Alaska would be relatively small. Statewide production of this species in 1991 was 45.5 million fish with Bristol Bay accounting for 56 percent of total landings statewide. With an additional three million sockeye salmon produced under the Main Bay alternative there would be an approximate 6.6 percent increase, based on 1991 landings, to the total Alaskan harvest of this species.

4.1.11 Recreation and Tourism

The issue of the impact to recreational and tourist activities due to sockeye salmon enhancement at the Main Bay Hatchery (Chapter 2) is addressed in this section.

There would be both positive and potentially negative impacts on recreation activities in the vicinity of the hatchery site. The increased production of sockeye salmon would provide for greater recreational/sport fishing opportunities along with the increased commercial fishing. The increased level of commercial fishing activity may have a negative effect on the recreation experience of people using the general area, although this is already a commercial fishing area and the character of the fishery will be about the same. The specific regulations for commercial, subsistence, and recreational fishing of sockeye salmon will be dependant on ADF&G fishing management practices and will be very important in determining the interactions between the fishermen.

Gulf of Alaska Salmon Revenues in 1991
by Gear type and Species



by ResourcEcon, 1992

Figure 4-3

The proposed project remote eggtake sites are currently utilized as sockeye salmon egg collection sites for the Main Bay Hatchery. Impacts to recreational users in these areas are currently slight, though a slight increase would be expected with longer periods of eggtake activities. Because of the proximity of a Forest Service cabin and its current popularity, potential impacts would be greater at Coghill than at Eshamy or Eyak Lake.

The impacts to recreation and tourism would vary depending on the location of the remote release operations. As with land use impacts; in areas such as Coghill, Eshamy, and Port Chalmers where commercial fishing for other fish stocks already occurs, there would likely be potential conflicts with recreational fishing activities. Floating net pens would also have some impact on wilderness recreation during April or early May of each year. This would probably be most evident at Coghill, which is a popular recreation destination.

Kings Bay is located within the WSA. Introduction of a fishery would constitute a new and intense, but short-term, water use. To recreational boat users in the remote area during the commercial fishing period there would be temporary, annually recurring impacts. Potential conflicts include visual and noise intrusion and a decrease in the quality of the recreation experience. Barry Arm, also in the WSA, has been receiving increasing kayak and tour boat use. Introduction of a fishery would result in annually recurring impacts. Potential conflicts include visual and noise intrusion and decrease in the quality of the recreation experience. During the commercial fishing season, tour boats and kayaks might choose not to use part or all of Barry Arm.

Long-term and Cumulative Impacts

There would be a cumulative impact on the availability of fish for sports fishing. The Coghill River and Eshamy Lagoon are popular sports fishing areas, and the production of additional high value sockeye salmon would make more fish available. It is projected that stocking of sockeyes at Coghill would be terminated in 1996, because the run is expected to be self sustaining at that point.

Depending on the location of remote release and terminal fishery sites, the proposed Main Bay alternative may have cumulative impacts on non-fishery recreation uses such as sight seeing, tour boat use, power boating, sailing, kayaking, and hunting activities. Remote releases and terminal commercial and sport fisheries in Barry Arm would add to existing recreation use of the area, potentially impacting the quality of the recreation experience, especially for some users. These impacts would take the form of spatial temporary displacement of the recreational user by the commercial fishing activities and degradation of wilderness characteristics of the area, including opportunities for solitude, inspiration, and primitive recreation. This would also be true to a lesser extent in the Coghill area, which has an existing commercial fishery as well as heavy recreation and tourism vessel use. Kings Bay is a more remote area with lower recreation/tourism use; however, the introduction of a commercial terminal fishery could have similar impacts.

4.1.12 Subsistence

The issue that increased enhancement of sockeye salmon at the Main Bay Hatchery may cause a significant restriction of subsistence harvesting activities (Chapter 2) is addressed in this section. The evaluation of impacts addresses the potential effects of project alternatives on competition from nonsubsistence users, whether access for subsistence use would be reduced, or whether subsistence use would be impacted because the abundance of populations of subsistence resources may be reduced. A formal ANILCA Section 810 subsistence evaluation is included in Section 4.2.13 of this chapter.

The activities of the Main Bay Hatchery Expansion Alternative that might have an effect on subsistence harvesting are limited to those associated with the harvest of returning salmon. The construction at the hatchery itself would have no effect on subsistence. The egg-taking activities will be conducted in accordance with regulations and ADF&G policies that will prevent any effect on the resource population, and the activities themselves will be so brief that no other effect on subsistence can be envisioned. The remote releases of the juvenile fish will entail "imprinting" in net pens, which will include one boat with a two-person crew to tend the pens for the two to three weeks the fish are in the pens. This activity should have no measurable effect on subsistence harvesting because of the small area affected, the few people involved, and the short time it occurs. The harvest of returning sockeye salmon at the hatchery or the remote-release sites is the activity that would bring the most people and equipment into the areas. The number of boats that might be expected to fish one remote release site would probably range from 100 to 250 with one or two people each, and in addition, some locations would be expected to attract some sport or subsistence fishing boats. Unlike fisheries for wild stocks of salmon, the sockeye fishery that develops at a remote release site from the hatchery expansion will have uninterrupted fishing from the time the fish arrive until the fish are harvested. This will leave little free time for fishermen at the harvest sites for other activities such as deer hunting.

The subsistence evaluation includes an evaluation of the effects of the proposed action on subsistence, an evaluation of the availability of other lands for the proposed action, and an evaluation of the availability of alternative ways of implementing the proposed action which would reduce or eliminate the proposed action from lands needed for subsistence purposes. As stated in Chapter 2 of this document, the interdisciplinary team evaluated other means of meeting the purpose and need and found that with current technology, no reasonable alternative to expansion or construction of hatcheries within Prince William Sound is available. They also evaluated 11 other hatchery sites as possible alternate locations and found that only one met the feasibility criteria of water supply and minimal interference with wild fish stocks.

The sections below address each sockeye salmon harvest location, including hatchery sites and remote-release sites. The evaluation is as site specific as possible and includes consideration of access, competition, and effects on populations of resource species.

4.1.12.1 Nelson Bay

Nelson Bay is located close enough to Cordova to be a likely use area for Cordova subsistence activities. Stratton (1989) mentioned Nelson Bay as a subsistence shrimp fishing location. If Nelson Bay were to be selected as a remote release site, seeking additional information would be helpful. Subsistence studies indicate that almost every Cordova household uses wild resources to some degree. Salmon, halibut, deer, and moose are the main species harvested by Cordova residents. Nelson Bay may be an important source of these species, and possibly also waterfowl, marine invertebrates and other resources. A subsistence mapping project was conducted by ADF&G in 1989 under sponsorship of the Forest Service. When the data are compiled and available, a more accurate determination of subsistence use patterns by Cordova residents will be possible.

One possible result of the development of a sockeye salmon fishery at Nelson Bay could be that commercial fishermen may harvest deer, clams, crabs, shrimp, and/or other species in competition with Cordova residents. Reportedly crabs and clams are already in decline in the Cordova area; further pressure on these resources may be damaging to Cordova subsistence (R. Miraglia, ADF&G Division of Subsistence, personal communication). However, the effects from the commercial fishermen associated with the remote release of sockeye salmon would be much lower than the similar effects that already exist in various places in Prince William Sound from purse seine fishermen, who are much more numerous, especially in intercept fishery areas. The sockeye fishery at a remote release site may last as much as four consecutive weeks between mid June and mid August, depending on the timing of the run. During this time, most subsistence harvesting efforts are focused on catching and preserving salmon rather than other resources.

A second possible effect is that the presence of commercial fishing could preempt subsistence hunting and fishing by some local subsistence hunters or fishermen. This effect is not a simple example of competition from nonsubsistence users. Many of the commercial fishermen are also subsistence fishermen and hunters from the Prince William Sound communities, and much of the subsistence resources used are either part of the commercial catch or are taken under a subsistence permit from the same vessel in the same trip. For this reason, the presence of the commercial fishing fleet would not clearly block access to subsistence fishermen for the most favorable fishing or hunting locations. Because of their association with commercial fishing, subsistence fishermen and hunters have a larger "home range" than they would otherwise have.

A third effect could be that the sockeye salmon fishery development would benefit subsistence harvests by increasing availability of a preferred fish. This new fishery would provide considerable benefit to subsistence fishermen and the other subsistence users with whom they share.

4.1.12.2 Port Chalmers

Montague Island, where Port Chalmers is located, is used by residents of Chenega Bay, Tatitlek, Cordova, and occasionally Seward for subsistence purposes. A generalized subsistence map for Tatitlek residents indicates use of both the coast and the inland area of northern Montague Island, including the area surrounding Port Chalmers and Green Island directly across from Port Chalmers (Stratton 1990). Draft data from ADF&G Subsistence Division indicate that Tatitlek households use the northern part of Montague Island for deer and marine mammal hunting. An estimated 45 percent of Tatitlek households said they used this area regularly for deer hunting. Five percent of Tatitlek households said they used the area regularly for marine mammal hunting.

The same draft data source reported that Chenega Bay residents use the northern part of Montague Island for salmon fishing, deer hunting and marine mammal hunting. An estimated six percent of households use the area regularly for salmon, 11 percent for deer and 17 percent for marine mammals. Stratton (1989) noted that Cordova residents use Montague Island for hunting deer.

Thus, as described above, increased commercial fishing activity could potentially have an impact on Tatitlek and Chenega Bay deer and marine mammal subsistence hunting if commercial fishermen harvest deer and other resources in competition with subsistence harvesters. The discussion under Nelson Bay above is also applicable here.

A significant positive impact on subsistence would be the availability of sockeye salmon, a preferred fish for home use in a location where they have not been available. The result will be a benefit to the subsistence communities that have commercial fishermen fishing the new sockeye fishery and to the nearest subsistence communities. In this case, Chenega Bay is close enough to reach the sockeye fishery in small boats.

4.1.12.3 Kings Bay

Upland areas of Kings Bay have been used by Tatitlek households for unspecified subsistence harvests in recent years (Stratton 1990). ADF&G estimates that 14 percent of Tatitlek households regularly use the Nellie Juan/Kings Bay area for hunting marine mammals. Six percent of Chenega Bay households use the area regularly for waterfowl, deer and marine mammal hunting (ADF&G unpublished draft data). Whittier residents used Kings Bay to hunt moose. From their old village site on Chenega Island, Chenega residents used to use Kings Bay for a wider variety of harvests: deer, moose, bears, goats, waterfowl, marine mammals, and furbearers. Because the community had just recently been established at its new location, hunters apparently had limited equipment and had not yet become thoroughly familiar with the area at the time the study was conducted (Stratton and Chisum 1986). Given a history of using Kings Bay for numerous resources in the 1960s when hunting from their old village site, it is possible that Chenega Bay residents might return to Kings Bay currently for some of the resources they had obtained there in prior decades. However, the main impacts to subsistence from enhancing the Kings Bay fishery likely would be minor and limited. Problems associated

with interactions between marine mammals and commercial fishing activities could impact the local marine mammal population, thus affecting the subsistence harvests of seals and sea lions. However, additional sockeye salmon at the hatchery and remote release sites may be beneficial to sea lions, which in turn could expand subsistence hunting opportunities. Increased sockeye salmon returning to Kings Bay would increase the availability of a preferred subsistence fish and provide a net benefit to subsistence users.

This location probably gets less subsistence use than Nelson Bay or Port Chalmers. Therefore, it is less likely that a fishery development project would conflict with subsistence uses here than in Nelson Bay or Port Chalmers. At the same time, it is too far from subsistence communities to have the added subsistence resource of a new sockeye salmon run benefit communities other than those who have subsistence fishermen who would be there for commercial fishing.

4.1.12.4 Barry Arm

Chenega Bay residents used Barry Arm for marine mammal hunting and the waters of Port Wells just in front of Barry arm for marine invertebrates in 1988 (ADF&G unpublished draft data). Other data from ADF&G preliminarily suggests that Chenega Bay residents use the "Port Wells/College Fiord/Coghill" area for salmon, waterfowl, and marine mammals. Eleven percent of the community households used this area in 1988 and six percent said they use the area on a regular basis. According to Stratton and Chisum (1986), in the early 1960s, Chenega residents hunted marine mammals, mountain goats, and waterfowl in Harriman Fiord (Barry Arm is the entrance to Harriman Fiord).

Stratton (1990) indicates that Tatitlek residents have used the coastline along both sides of Barry Arm to hunt marine mammals; Tatitlek residents also have hunted deer along the shores of Port Wells, bordering on Barry Arm. Preliminary data from ADF&G show that Tatitlek households use the Port Wells/College Fiord/Coghill area for marine mammals, with 14 percent of the households using the area regularly (ADF&G unpublished draft data).

Cordova residents use Port Wells for subsistence shrimp fishing, likely in conjunction with commercial salmon fishing at Coghill (Stratton 1989).

Developing a sockeye salmon fishery in Barry Arm would bring more commercial fishing activity to this area. To the extent that nonsubsistence commercial fishermen placed added pressure on deer and/or marine mammal populations, subsistence pursuits of these species in this area could be impacted negatively. On the positive side, local subsistence fishermen would prefer sockeye salmon over pink salmon and would therefore be significantly benefitted.

4.1.12.5 Coghill

Tatitlek residents have used the coastline around the Coghill area (on both sides of Port Wells and College Fiord) (Map 3) to hunt marine mammals, and Port Wells for hunting deer (Stratton 1990). Draft ADF&G data indicate that Tatitlek households use the large area referred

to as "Port Wells/College Fiord/Coghill" for marine mammal hunting, with 14 percent using the area regularly. Cordova residents use the Port Wells area for subsistence shrimp fishing, probably while commercial salmon fishing at Coghill (Stratton 1989).

In the mid-1980s, Chenega Bay households conducted some marine mammal hunting farther up College Fiord, and marine invertebrates were harvested at the mouth of College Fiord (Stratton and Chisum 1986). Draft ADF&G data mentioned in reference to Barry Arm applies to Coghill: Chenega Bay households use the Port Wells/College Fiord/Coghill area for salmon, waterfowl and marine mammals, with six percent using the area regularly.

As commercial fishing already occurs in the Coghill area, the impacts of the proposed sockeye salmon release would likely conflict very little if at all with subsistence pursuits. The extended presence of fishermen could increase any displacement and/or diminishment of marine mammal populations caused by commercial fishing, thereby impacting subsistence marine mammal hunting.

A beneficial impact on subsistence would be the increased availability of sockeye salmon for subsistence use.

4.1.12.6 Main Bay/Eshamy

Chenega residents in the 1960s used the area around Main Bay (Map 3) for hunting deer (Stratton and Chisum 1986). In the late 1980s, Chenega Bay residents indicated they used the Knight Island/Dangerous Passage area mainly for salmon and marine mammals but also for other finfish, shellfish and waterfowl; 50 percent of Chenega Bay households said they used this area regularly, according to preliminary ADF&G estimates. One sub-area identified within the "Knight Island/Dangerous Passage" category was Eshamy. An estimated six percent of Cordova households used Eshamy for salmon fishing and marine mammal hunting on a regular basis. An estimated 17 percent of Chenega Bay households regularly use the Dangerous Passage/Whale Bay sub-area for salmon, 11 percent for finfish, six percent for shellfish, 17 percent for waterfowl, 28 percent for marine mammals, and 39 percent for any resource. Preliminary data on the Knight Island Passage sub-area suggest that 11 percent of Chenega Bay households use this area for salmon, six percent for other finfish, waterfowl and marine mammals. Twenty-two percent of Chenega Bay households use this area for any resource on a regular basis. Knight Island (as a separate geographic category from the above area categories) is used by 50 percent of Chenega Bay residents on a regular basis for hunting deer (ADF&G unpublished draft data).

Mapped data on Tatitlek use of this area show that residents have used the area just south of the mouth of Main Bay (Stratton 1990). Draft ADF&G data estimated 18 percent of Tatitlek residents use the Knight Island/Dangerous Passage area for any resource, the main ones being salmon and deer (five percent each) and marine mammals (14 percent). Knight Island is used by an estimated 18 percent of Tatitlek households also, mainly for deer (14 percent) and marine mammals (nine percent) (ADF&G unpublished draft data).

Cordova residents use the Eshamy area for subsistence shrimp fishing (Stratton 1989).

The pursuit of subsistence salmon in this area could be enhanced by the replacement of pink with sockeye salmon. On the other hand, increased presence of commercial fishing activity in this area could place pressure on the other resources local subsistence hunters obtain in this area, such as deer, marine mammals, shell fish and other finfish.

Summary

The effect of increasing sockeye salmon likely would enhance subsistence fishing since this species is preferred. Those subsistence users with commercial permits (or working as a crew member on a commercial fishing operation) likely would take sockeye salmon from the commercial harvest for home use. Subsistence hunters are reported to believe that an increased run of sockeye salmon would bring more seals, which are hunted for subsistence and are one of the favorite foods in Chenega Bay and Tatitlek.

There is concern that an increased run of sockeye salmon would increase the level of commercial fishing activity and increase competition for various other subsistence resources. Competition for subsistence fishing is not seen as a problem; rather, competition for deer is the primary impact potentially arising from fishery enhancement (and, secondarily, conflicts with subsistence harvests of marine mammals and marine invertebrates, as well as possibly other species). The enhancement of the sockeye runs may allow the fishing season to open a little earlier than now. Commercial fishermen often hunt deer between fishing periods occurring after deer hunting season opens (August 1). This problem has actually occurred in the Chenega Bay area, associated with the larger purse seine fishery. In recent years, intense fishing in places such as Elrington Passage has been associated with a decline in the local deer population so that Chenega Bay people have had to hunt elsewhere or rely on relatives in Cordova, for example, to supply meat. The remote release sites are all much farther from the subsistence communities than the Elrington Passage example, and a maximum of about one fourth of the sockeye fishery would occur after August first. The proposed enhancement of the sockeye salmon fishery will also have the effect of spreading fishermen (and hunters) over more area, so one area does not get hunted as much. Therefore, the effect of nonsubsistence hunter competition with local subsistence hunters will be very small.

A second possible negative impact is that the increased amount of commercial fishing activity might disturb and displace seals and sea lions that subsistence hunters pursue in the areas affected. This impact will also be small because of the dispersed nature of the fishery and the distance from subsistence communities. Any displacement that occurs will be for a short time and in a small area. Some hunters are reported to believe that an increase in sockeye slamon will attract more seals and sea lions and improve hunting.

Cumulative Impacts

Cumulative impacts from other past, current, or reasonably foreseeable future actions combined with impacts from the proposed Main Bay hatchery expansion may be important. These impacts may extend to competition for resources other than salmon (e.g., deer). The main problem has occurred where hunting pressure has been concentrated in one area enough

to reduce the deer population, and then only when the local area is near enough to a subsistence community to be in their usual subsistence harvesting area. While the proposed enhancement of the sockeye fishery will facilitate associated deer hunting during the part of the fishery that occurs after August first, it will also disperse the fishermen into several widely separated areas, which should prevent the reduction of local deer populations. Therefore, the cumulative effect should also be small. In addition, conflicts with subsistence harvests of marine mammals and marine invertebrates may occur, but would also be small.

4.2 THE ESTHER ISLAND ALTERNATIVE

4.2.1 Vegetation and Wetlands

The Esther Island Hatchery was built primarily on top of gravel fill that was placed in an intertidal area thus disturbing only small areas of vegetation. Little or no vegetation would likely have to be removed as construction activities would entail the demolition and reconstruction of new facilities on existing foundation pads. Current plans do not include any gravel fill or construction activities in wetlands.

There would be no additional impacts to marine vegetation in Lake Bay as a result of saltwater rearing as no new netpens would be constructed under this alternative.

There would be no impacts to vegetation resulting from remote release activities as fry releases would be directly into approved lakes without the use of netpens or the need for extended stay shoreline accommodations. Remote eggtake activities would not impact vegetative communities.

Long-term and Cumulative Impacts

There would be no long-term and cumulative impacts to terrestrial vegetation and wetlands under the Esther Island alternative. Proposed levels of chemicals or reagents in hatchery wastewater discharge would be non-toxic and would comply with State and Federal wastewater standards and should not cause a measurable, long-term impact to marine or aquatic vegetation.

4.2.2 Fish and Wildlife

Both permanent and temporary displacement of wildlife, due to habitat loss and noise, occurred at the head of Lake Bay in 1985 when the existing hatchery was constructed. There would be further temporary displacement of on-site wildlife, from hatchery remodeling and expansion due to noise and disruption during construction activities.

Impacts to fish and wildlife from noise and construction activities in Lake Bay would be the same as those discussed under the Main Bay Alternative.

Planned wastewater discharges into Lake Bay during operation would derive from incubation effluent and domestic wastes. Domestic wastewater discharged into Lake Bay would increase by approximately 240 gallons per day making the estimated total domestic discharge 2,190 gallons per day. No impacts are expected to fish and wildlife from the increased volume of domestic discharge. The effects of increased effluent discharge into Main Bay on water quality is discussed in Section 4.1.3.

No additional impacts are expected to fish and wildlife as a result of the Esther Island Hatchery's full utilization of permitted volumes of water from Esther Lake. Drawdown of Esther Creek would not have a measurable impact on fish or wildlife habitat because the substrate is dominated by white granite bedrock.

The only known endangered or threatened species occurring near the site are humpback and fin whales, and sea lions. There would likely be no displacement of these animals near the hatchery since it is located well within Lake Bay in relatively shallow water. During remodeling, as barges are delivering supplies, there may be some temporary displacement occurring at the mouth of, or outside of Lake Bay.

Under the present plan, there would be no sockeye salmon returning to the hatchery. Consequently there would be no additional impact to other species of fish inhabiting Lake Bay, and no additional carcasses would be dumped.

Annual disturbance and displacement of off-site wildlife would occur at remote eggtake and remote fry release locations. Displacement of off-site wildlife would be the result of fixed-wing aircraft noise, eggtake and fry release activities, as well as activities associated with either temporary on-shore tent camps or anchored vessels with affiliated skiff traffic.

Additional sockeye salmon returns at remote-release sites would likely attract more wildlife such as seals, sea lions, black bears, bald eagles, and gulls to those locations. There may be temporary disturbance and/or displacement of wildlife from annually reoccurring fixed-wing aircraft support to remote eggtake and release operations. No other impacts are expected from remote eggtake and release activities.

<u>Interaction between Wild and Hatchery Stocks:</u>

The issue that introduction of a hatchery stock of sockeye salmon at the Esther Island Hatchery may have an effect on wild, or naturally occurring, stock (Chapter 2), is addressed in this section.

For the Esther Island alternative a portion of the pink salmon production would be replaced by an approximate 9.4 million sockeye salmon fry. This may have an adverse impact on wild stocks by increasing food resource competition between stocks and by interfering with the discreetness of stocks. To mitigate the impact to wild stocks, hatchery-reared sockeye salmon would be released during times of peak zooplankton abundance. These abundances would be determined during bi-weekly sampling surveys at release sites. This release strategy

would be designed to increase survivorship to the hatchery-reared stocks and to reduce competitive interactions between hatchery and wild stocks.

For the adults returning to candidate lakes, there may be some interaction impacts. To reduce these interactions as well as potential genetic implications of a mixed stock return, the remote release sites at the candidate lakes were chosen since they contain no wild stock runs. The timing of the enhanced returns at these sites would not create a mixed stock fishery potentially detrimental to a particular wild stock.

At the Coghill and Eshamy remote release sites only F_1 generation fry (the progeny of wild stock) would be released. This would be done to help reduce genetic problems associated with using hatchery stock for remote releases.

Long-term and Cumulative Impacts

There would be no long-term displacement of upland wildlife, although short-duration displacement would likely occur during construction activities. Annual short-term displacement would occur during eggtake operations and at remote release locations.

There may be potential cumulative impacts due to interaction between wild and hatchery-reared stocks of sockeye salmon. During early marine life stages there may be competition between these stocks for food resources when the Eshamy and Coghill lake released fry migrate to the marine environments. There would not be competition between the candidate lake released fry and wild salmon as there are no naturally occurring salmon populations.

The lakes considered are all oligotrophic. The sockeye juveniles remove nutrients from the lake when they migrate to the sea. On barriered systems, returning adults are denied access back to the lake. Since nutrients are not recycled, the lakes become even more nutrient poor, and the productivity is significantly reduced (Koening and Burkett, 1987). Some sort of artificial nutrient enrichment may be required to restore and maintain plankton populations (Carpenter, 1992).

Small oligotrophic lakes are most susceptible to the macroplankton collapse, as they have low phytoplankton populations or food base, little refuge area foe zooplankton to escape predation, and rapid lake flushing (how long it takes to replace lake water) which remove plankton from the lake.

In a lake system with resident fish, populations may suffer. The fry stocked may provide immediate prey items for resident fish, but if the nutrient cycle collapses, the long term result would be diminished numbers and or size of the resident fish. In barren lakes, the survivorship of the planted fry would be very low after the nutrient cycle collapse.

Interaction of wild and hatchery may also occur during adult return and commercial fishing activities. At the remote release locations this would be mitigated by utilizing sites with no historic wild stock runs or by using hatchery stocks with different run timing. The impacts

of adult interaction between wild and hatchery stocks would be the same as those described under the Main Bay Alternative. Proposed levels of chemicals or reagents in hatchery wastewater discharge would be non-toxic and would comply with State and Federal wastewater standards and should not cause a measurable, long-term impact to marine or aquatic vegetation.

The impacts of adult interaction between wild and hatchery stocks would, in general, be the same as those described under the Main Bay Alternative. Concerns for the spread of disease through straying of returning sockeye salmon into other streams containing wild stocks, particularly chum salmon which are susceptible to IHNV, is addressed in the ADF&G Fish Disease Policy (ADF&G 1988). The policy describes specific procedures such as broodstock screening, eggtake techniques and pre-release inspections for reducing the risk of transporting finfish diseases between wild stock and between hatchery and wild stocks. Pre-release sampling for IHNV is required for hatchery cultured sockeye salmon and any lots showing clinical signs or in which the virus is isolated must be destroyed. It is recognized that these procedures do not completely eliminate the possibility for disease transfers because all sockeye and kokanee are presumed carriers but, there are numerous watersheds in Alaska where sockeye salmon reside with stocks of chum salmon and, to date, no outbreaks of IHNV in wild chum salmon have been documented.

4.2.3 Hydrology and Water Quality

The issue of potential impact to the hydrology of Esther Lake and the water quality of Lake Bay, as outlined in Chapter 2, is addressed in this section.

Permitted water usage at the Esther Island Hatchery would not be affected by additional production of sockeye salmon. The additional quantity of water to be used for sockeye salmon production, 10 cfs, is based on currently non-utilized amounts of water within the hatchery's already permitted quantity of 80 cfs. As with Main Bay alternative, winter and spring drawdowns are likely to occur on Esther Lake. Modeling of the extent, timing and duration of drawdowns on Esther Lake has not been done. Hatchery flow data has been collected since 1987.

Hatchery effluent waters would be treated and discharged into saltwater via a diffuser in deep water away from the pink salmon rearing pens. The disinfection agent would be a 0.5 mg/l dosage of chlorine for a five minute contact time. These values were determined to be effective means to inactivating IHNV. In addition, the effluent would include: iodophor for hatchery disinfection, malachite green for egg treatment, and low levels of natural salt water to treat hardness. Egg treatments with malachite green are being phased out and replaced with natural salt water treatment. Wastewater discharges would be non-toxic and in compliance with permitted State and Federal wastewater standards. Effluent from the hatchery would include waste product from salmon fry and eggs. Such waste will include minor increases in nitrogen and phosphorus and a slight reduction of dissolved oxygen. IHN virus is common in wild and hatchery stock of sockeye salmon. If straying of hatchery stock occurs, IHN virus should not cause higher than normal incidents of the disease.

The effects of residual chlorine on the environment have been the subject of numerous studies (see EPA 1976 for reviews), although the findings are difficult to apply with precision to any particular sewage outfall.

The chlorination of wastewater and discharge to the marine environment has the potential to cause adverse effects, however discharge at the 0.5 mg/l level would be immediately neutralized by tidal flushing and contact with organics in the marine environment.

Very little free chlorine exists after mixing with sewage effluent. When the water contains ammonia, as in the case of sewage effluent, monochloramine, dichloramine, and nitrogen trichloride are formed. These and a few other oxidizing species formed by chlorination, are collectively known as total residual chlorine (TRC). Apart from the toxicity of residual chlorine in the effluent, there may be toxicity associated with these other oxidation products of chlorination, known as chlorine produced oxidants, or CPO. Examples are the reactions of chlorine and ammonia (and amino acids) in sewage to give chloramines (and bromamines in seawater), produced in the presence of ammonia. Chloramines are less oxidizing than chlorine or hypochlorous acid, however they are more persistent in the environment. Depending on the molar ratios of chlorine and ammonia, mono-, di-, and tri-chloramines may be produced by chlorination of wastewaters. These are included in any chemical analysis of total oxidant, and have differing degrees of toxicity. In addition, some products of chlorination of effluent may result in non-oxidizing but toxic compounds. Thus, measures of chlorine residuals are difficult to correlate with toxicity concentrations, especially for complex effluent such as wastewaters.

Any free chlorine remaining after effluent oxidation is unlikely to remain long after contact with seawater. That which has not reacted with organics is consumed in seawater in two phases, rapidly for about the first hour, and slowly thereafter (Wong & Davidson 1977). Up to 3.3 mg/l has been shown to be consumed within 30 hours. Reaction kinetics in the slow phase are complex (Eppley et al. 1972). Chlorine in seawater reacts with bromide ion to form hypobromite and hypobromous acid, the reaction apparently reaches completion in 2.5 minutes (Wong & Davidson 1977). These may react further with ammonia to form bromamines. Thus, the end result of effluent chlorination is a complex mixture, with a fraction analyzable as total residual chlorine, which is continually changing qualitatively and quantitatively.

There would be a five minute contact time for chlorine with incubation effluent at the Esther Island hatchery before discharge to seawater. After that length of time little or no free chlorine would exist when discharged to seawater and any remaining chlorine would be consumed rapidly by seawater.

Additional domestic waste water from the expanded living quarters would be treated in a newly installed septic tank system. Approximately 240 gallons per day would be treated in the new system adding to the existing discharge of approximately 650 gallons per day. The discharge of wastewater effluent containing nutrients such as phosphates and nitrates (found in hatchery effluents) into natural water bodies can stimulate algal growth resulting in an "algal bloom" a short term chemical impact. There are no records (from the EPA or ADEC) to

indicate that effluent discharges from the Esther Island Hatchery into Lake Bay have caused any water quality impacts. Because effluent discharge volumes will remain within the facility's currently permitted discharge volumes, no additional impacts are expected to Lake Bay water quality.

Long-term and Cumulative Impacts

Under the Esther Island alternative, lake water currently being used for incubation of pink salmon would be diverted to sockeye salmon production with an estimated incremental increase in water demand of 10 cfs. The additional quantity of water to be used for sockeye salmon production is based on currently non-utilized amounts of water within the hatchery's already permitted quantity of 80 cfs. Drawdown would likely occur on Esther Lake during most years. These drawdowns would take place at various times from December to May.

No long-term or cumulative impacts are expected on water quality.

4.2.4 Air Quality and Noise

The operation of construction equipment, vehicles, and increased use of diesel-powered generators for back-up electricity would cause localized air and noise pollution during remodeling operations.

The sound of power generators and other equipment would also cause an undetermined amount of disturbance to adjacent areas and may temporarily displace some wildlife species (see Section 4.2.1).

Air and noise pollution would increase slightly with an expanded facility. Increases in the amount of fixed-wing air traffic, Table 4-5, to and from the area would result in recurring noise and air pollution. Combustible waste from hatchery operations are currently burned in an incinerator. Additional combustible wastes generated by the hatchery re-construction and operation would also be burned in incinerators. Debris from construction would be burned on-site with extreme caution. Smoke from these wastes would cause temporary localized air pollution. Lake drawdown from December to May, as well as diminished flows in Main River, could detract from the wilderness character of the area. However, this drawdown may be difficult to detect visually.

Long-term and Cumulative Impacts

The Esther Island alternative would continue to rely on diesel power generation with hydroelectric backup. No additional long-term or cumulative impacts are expected.

Annually recurring, short-term impacts to air quality and noise would result from fixed-wing aircraft support of remote eggtake and release activities.

TABLE 4-5
ESTHER ISLAND - WALLY NOERENBERG BOAT AND PLANE TRAFFIC

Month	Existing		Expanded	
	Boat	Plane	Boat	Plane
January	4	2	4	3
February	6	2	6	3
March	6	2	6	3
April	6	2	8	3
May	6	2	8	3
June	6	6	8	8
July	6	6	8	6
August	6	4	8	6
September	6	2	4	6
October	6	2	8	8
November	6	2	8	2
December	4	2	4	1

4.2.5 Wilderness

The issue concerning the effect of the proposed development on the wilderness character of the Nellie Juan-College Fiord Wilderness Study Area, as outlined in Chapter 1, is addressed in this section. The Esther Island Hatchery, located on the southern portion of Esther Island is located on a State of Alaska inholding within this Wilderness Study Area. Off-site activities, such as eggtakes and remote releases would be conducted within the WSA and as such may impact the wilderness or visual character.

The alternative to expand the Esther Island Hatchery would not directly affect any existing or proposed wilderness, wilderness study areas, or other national conservation units. The lands immediately surrounding the facilities are administered by the State of Alaska and are an inholding in the Nellie Juan-College Fiord Wilderness Study Area. The existing hatchery facilities are located in a Special Use Permit area inside a State Marine Park.

Because the expansion of facilities would occur in an area of State of Alaska lands, the potential for the wilderness designation of adjacent WSA lands would likely not be impaired. The area of State of Alaska lands around the facilities would largely buffer the effects of construction and operation activities from the adjacent Nellie Juan-College Fiord Wilderness Study Area.

Noise and activity associated with construction of the new facilities may temporarily intrude on the wilderness values of areas of the WSA closest to the existing Esther Island Hatchery facilities. Opportunities for solitude along portions of the southern shoreline along Wells Passage may be slightly diminished by increased aircraft and boat traffic that would occur during construction. In these areas, construction activities may also temporarily degrade the wilderness experience sought by backcountry recreation users of areas influenced by the sights and sounds of these activities. Similarly, opportunities for primitive recreation experience may also be reduced temporarily.

Like the existing facilities, the presence of new structures would be very evident to recreation users, and their open visibility would degrade the primitive recreation experience sought by backcountry users of shoreline areas in Lake Bay and in the State Marine Park. In addition, the presence of new structures would further degrade the apparent naturalness of the surrounding area. However, because of the area of the State of Alaska lands between the facilities and the Nellie Juan-College Fiord Wilderness Study Area, the new structures would not affect the apparent naturalness or the natural integrity of the surrounding WSA.

The sights and sounds of boats or floatplanes engaged in eggtakes and remote release activities in the Coghill Lake area would occasionally diminish opportunities for solitude in this area. It is anticipated that eggtakes conducted in the WSA would occur during mid-August in the Coghill system and during early October in the Eshamy system. Remote releases would occur in early spring as soon as the lake ice melts in Coghill and Eshamy lakes as well as the candidate lakes. Opportunities for primitive recreation experiences in the near vicinity of these off-site areas would also be temporarily disrupted when these activities occur. These activities would not affect the apparent naturalness or natural integrity of these off-site areas.

To minimize the effects of the facilities on the apparent naturalness, the use of construction materials with colors and textures that blend with the natural character of the surrounding area are recommended as mitigation. This would help to make the facilities more compatible to recreation users of the State Marine Park.

The harvesting of fish at the return sites will bring a lot of boats into a relatively small area of the WSA at each site for the period of time required to harvest the fish. At Coghill and Eshamy, this will be an addition to an already existing fishery, which will probably have the effect of making the fishing busier, but may not increase the number of boats or the length of time substantially. The fishing would occur between June and August, depending on the stocks and the run timing. During this time, the opportunity for solitude, inspiration, and a primitive recreation experience would be disrupted at these sites.

Long-term and Cumulative Impacts

At undisturbed eggtake and remote release sites there may be some cumulative degradation of the wilderness value of the natural ecosystems. These would be due to boat and fixed-winged aircraft traffic as well as sport and commercial fishing activities. The fish harvesting activities will also add to existing impacts on wilderness character.

4.2.6 Visual

Viewers Impacts

Expansion of the existing facilities at the Esther Island Hatchery would be openly visible to boaters and other recreation users who enter Lake Bay. Typically, the presence of structures in the natural landscape results in strong visual contrasts. However, because the new hatchery building and other ancillary structures would be placed adjacent to, or in place of existing

structures, weak to moderate visual contrasts are expected to result. Because of the visual contrasts associated with the existing hatchery facilities, moderate visual impacts are expected to occur. These impacts would occur where the construction activities and new structures are visible to foreground views from boats and other users in Lake Bay and along the bay's shoreline.

The visual contrasts of the new facilities would be reduced somewhat by matching the color, texture, and materials used in the construction of the existing facilities. Where possible, new structures would be situated to take advantage of screening by existing structures or by natural features.

Some visual impacts would occur during eggtake and remote release operations. These operations which would occur in the Eshamy and Coghill systems as well as at candidate lakes would entail use of fixed-wing aircraft and motor vessels.

Compliance with VQOs

Because the Esther Island Hatchery alternative is entirely located on State-administered lands, there would be no effect on VQOs at the hatchery site.

4.2.7 Cultural and Historic Resources

No archeological materials have been located at the Esther Island Hatchery site. In the event that archeological or historic resources are discovered during developmental activities, all operations would cease, and the State Historic Preservation Office would be notified immediately. The site would be treated in accordance with the requirements of the National Historic Preservation Act of 1966, Executive Order 11593 of 1971, and 36 CFR 800, the procedures for the Protection of Historic and Cultural Properties.

4.2.8 Land Use, Ownership, and Management

4.2.8.1 Land Use

The proposed alternative would result in a moderate expansion of existing land and water uses at the Esther Island Hatchery. Construction activities, which would last approximately a year and a half, would occur within the current boundaries of the existing hatchery site. The level of hatchery and support uses would increase, although the timing and duration would be similar to existing activities.

The proposed project would result in an incremental increase in existing land and water uses associated with eggtake and remote fry release operations at Eshamy, Coghill, and the candidate lakes.

Remote fry release operations would constitute new annually recurring water uses at the potential remote release lake sites. Activities would include landing float planes at the lakes

chosen for remote release of fry after the ice goes out, releasing the fry from tanks and the leaving the site.

4.2.8.2 Land Ownership

The proposed alternative would not result in any land ownership impacts at the Esther Island Hatchery site. The existing use permit from the State of Alaska for the hatchery may need some modification.

The proposed project would not result in any changes in land ownership. PWSAC would continue to apply for permits from the Forest Service required for remote eggtake activities. For the potential remote release sites, appropriate State and Federal permits would be required for release operations on affected lands and waters.

4.2.8.3 Land Management

The Esther Island hatchery is located in a State Marine Park and as such is governed by the State Area Management Plan administered by the Alaska Department of Natural Resources (ADNR). The State Marine Park is surrounded by the Nellie Juan-College Fiord Wilderness Study Area (Map 1) managed by the Forest Service. Management of the State Marine Park would not be impacted by the conversion of the hatchery to sockeye salmon production. In areas such as Coghill and Eshamy where commercial fishing for other stocks already occurs, the effect of the proposed action would be to extend the period of fishing activity.

<u>Long-term and Cumulative Impacts</u>

There would be some potential cumulative impacts on land uses and management as a result of selecting remote release lakes. Creation of remote release and terminal fishery sites could require additional management to respond to potential use conflicts.

4.2.9 Socio-economics (non-fisheries)

Potential socio-economic impacts would be created by several aspects of the proposed hatchery expansion and associated activities. These include temporary and permanent employment and wages created by project construction and operation, which would in turn affect the population at the hatchery site. Project expenditures associated with construction and operation would affect the local economy to some degree, through purchase and transport of supplies. Additional demands may be placed on hatchery site and community facilities and services through increased population and fish rearing demands on-site, and off-site fish processing and employment created by the project. Public revenues would be increased by the sale of additional fish harvested and processed; public expenditures could be affected indirectly by the project through the need to provide additional public services.

4.2.9.1 Employment and Income Characteristics

Construction of expanded hatchery facilities for the Esther Island alternative would be similar to the that of the Main Bay alternative, although the scope and level of activity would be approximately half that of Main Bay. Approximately nine temporary construction jobs would be created at the hatchery site and are likely to last 1.5-2 years in duration. Approximately $1.8 million in temporary wages would be created.

Operation of the Esther Island alternative would create one additional permanent operation job. Using the current payroll for five permanent employees at the Main Bay Hatchery ($183,705 paid annually), and average payroll per employee, the additional permanent employee would create an annual payroll of $36,741.

The proposed project would result in an increase in activities associated with both eggtake and remote fry release operations. Up to two additional temporary employees would be needed, and would be based at the hatchery site. Using the current payroll for 10 temporary employees at the Main Bay Hatchery ($92,324 paid annually) and average payroll per employee an additional two temporary employees would create an annual payroll of $18,464.

4.2.9.2 Population Characteristics

Construction of the proposed Esther Island alternative would result in a temporary population increase associated with the construction jobs. This population increase would occur at the hatchery site, and would last a year and a half in duration.

Operation of the proposed Esther Island alternative would result in a permanent, on-site population increase of three associated with hatchery operation. With a current average of one dependent per employee on site, the total permanent population increase at the hatchery would be six. Additional temporary employees would increase the population at the hatchery site to 10 during the summer months.

No population increases off-site or in surrounding communities attributable to the proposed project are anticipated.

4.2.9.3 Local Economy

Assumptions from the Esther Island alternative would be identical to the Main Bay alternative; however the amount of construction wages would be smaller. Some portion of the $1.8 million in construction wages would be spent in local communities contributing to the local economy. Construction expenditures estimated at $9.8 million may also result in the purchase of supplies locally, and may require local transportation services to bring materials to the construction site.

A portion of permanent and temporary hatchery operations wages totalling $55,205 are likely to be spent in local communities. The creation of $5.2 million in additional fish

harvesting income, and $3.5 million in fish processing income from expanded production would also increase benefits to Cordova, Valdez and Whittier; Seward, Tatitlek, and Chenega Bay would be affected to a lesser extent.

4.2.9.4 Public Finances

The proposed Esther Island alternative would increase State and local revenues, primarily through tax revenue created by the sale of raw and processed fish. The State of Alaska charges a 3% raw fish tax on fish delivered to shore-based processors, which includes nearly all salmon. Assuming an estimated raw fish cost (price to fishermen) of $5.2 million, the annual raw fish tax on Esther Island Hatchery sockeye salmon would be approximately $156,000. Approximately half of this tax revenue would be returned to the affected communities on the basis of fish landed in the community. Additional revenues would be created through collection of sales taxes on purchases using income generated by project employment, and fish harvest and processing income.

Public expenditures would occur in two potential areas: additional fishery management effort associated with monitoring harvest of increased production, and provision of additional water, sewer, and electricity to fish processors. It is likely that existing ADF&G staff would be utilized for fisheries management. Service charges and tax revenues would cover the cost of additional utility service.

Long-term and Cumulative Impacts

Expansion at the Esther Island facility would add an estimated $5.2 million to the commercial fishing industry and $3.5 million to the fish processing industry.

Production of relatively high value sockeye salmon would create additional employment and income in an area where uncertain fish returns and prices have caused economic hardships in recent years. Additional production for commercial fish processors would create additional wages, increase the economic viability of fish processors, and create additional tax revenue for State and local governments.

4.2.10 Commercial Fisheries

The issue concerning the impacts of production of sockeye salmon at the Esther Island Hatchery to the commercial fishing industry in Prince William Sound and on the processing of fish (Chapter 2), is addressed in this section.

In the Esther Island alternative, sockeye salmon fry would be produced at the Wally Noerenberg II facility and released at remote sites. The existing pink salmon production at this hatchery would cease in favor of the new sockeye salmon production.

4.2.10.1 Biology/Management

This alternative calls for remote release of sockeye salmon fry produced from Coghill and Eshamy stocks. A schematic chart of the Esther Island alternative is shown in Figure 4-4. This chart diagrams the numbers of returning adult sockeye salmon by stock, the distribution of remote releases, the allocation among the different types and the allocation to PWSAC for corporate cost recovery.

The remote release sites identified for the Esther Island alternative would be in the Coghill and Eshamy river and lake systems as well as other candidate lakes. There would be some management concerns over enhanced fisheries in these areas due to recent weak wild stocks. Regardless of the lakes ultimately selected, it is assumed that equitable distribution among the user groups would be maintained.

As the results of annual harvest data accumulates, a realistic picture of gear type harvest percentages would become apparent. Adjustments in production/release, or management strategies would be recommended to reflect fair and equitable allocations as established in the regional allocation policy.

Since this alternative would not provide for smolt release from the Main Bay hatchery, benefits to the set gillnet fishery would be relatively minor. If necessary, time/area adjustments in fishing areas may be necessary to maintain the required distribution of benefits.

4.2.10.2 Economics

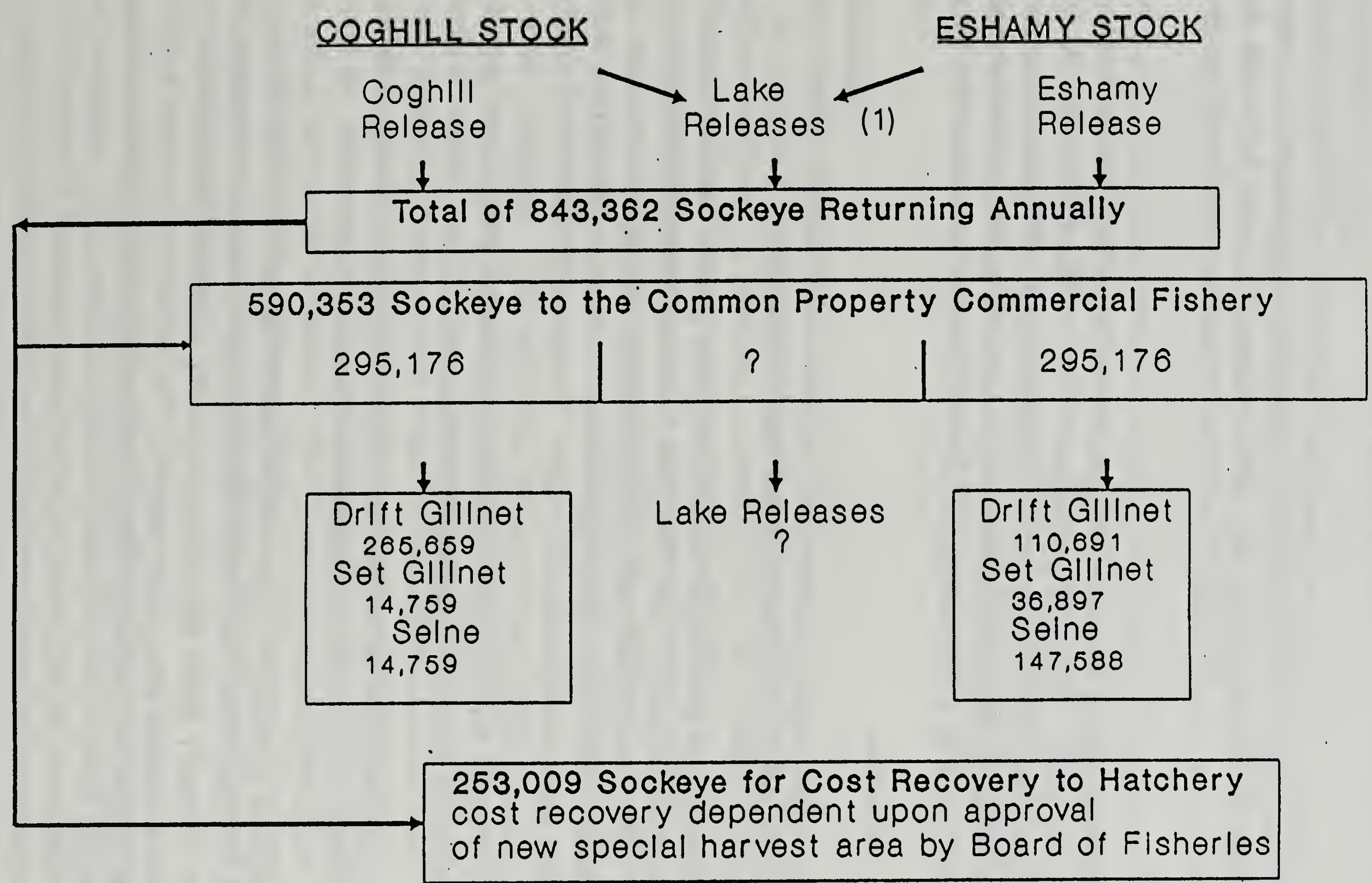
The Esther Island alternative would produce approximately 1-1.2 million returning sockeye salmon. This alternative would incur an additional economic expense since all eggtakes, cost recovery, and brood stock acquisitions would occur in a location remote from the hatchery.

By the year 2001, there would be a increase of approximately 843 thousand sockeye salmon to the different gear types and to PWSAC for cost recovery. Figure 4-2, in Section 4.1.10.2, shows the relative distribution of annual benefits that would accrue to each group. The annual benefits shown in this figure total $7.5 million per year. The assumptions utilized in calculation of annual benefits are: a factor of 6.1 pounds per sockeye salmon and a price of $1.45 per pound. Cost recovery to PWSAC would be dependent upon approval by the Alaska Board of Fisheries of new special harvest areas near one of the remote terminal harvest areas.

The effect of ceasing pink salmon production at the Esther Island Hatchery would mean that current production and harvest of 1.3 million pink salmon would not continue. At a factor of 2.50 pounds per pink salmon and a 1992 in-season price of $0.18 per pound, this results in an estimated loss of $585,000 per year.

Esther Island Alternative

Distribution of Returning Adult Sockeye



(1) feasibility of lake releases uncertain

Assumption: There may need to be adjustments in numbers and locations of remote releases, and in management strategies to maintain the set net fishery benefit within historic proportions thus allowing a fair and equitable allocation between gear types.

Figure 4-4

Long-term and Cumulative Impacts

Long-term impacts to the fishing industry would include direct financial benefits to fishermen, processing companies, and communities as described above. An additional impact would be the diversification of the fishery among species.

Sockeye salmon traditionally command the highest prices and strongest demand of all the salmon species (with a few exceptions such as Yukon River king salmon). Increasing sockeye salmon production by approximately one million sockeye salmon, as in the Esther Island alternative, would tend to add stability and diversification to the fishing industry in Prince William Sound.

The long-term impact of hatchery expansion on the sockeye salmon industry in Alaska would be relatively small. Statewide production of this species in 1991 was 45.5 million fish with Bristol Bay accounting for 56 percent of total landings. With an additional one million sockeye salmon produced under the Esther Island alternative, there would be an approximate 2.2 percent increase, based on 1991 landings, to the total Alaskan harvest of this species.

4.2.11 Recreation

The issue of the impact to recreational activities due to sockeye salmon enhancement at the Esther Island Hatchery (Chapter 2) is addressed in this section.

The Esther Island Hatchery is situated in a State Marine Park and as such is governed by the State Area Management Plan. This plan encourages traditional and recreational use of park land and water. Recreational activities pertinent to hatchery development include boating and sports fishing. Since there would be no release of sockeye salmon fry at the Esther Island Hatchery facility, there would be no adult return. Consequently there would be no impacts from increased commercial fishing activity in the Lake Bay area. However, there would be an increase in fixed-wing aircraft traffic in the area associated with remote eggtake and release operations that would moderately impact recreational opportunities in the vicinity of Lake Bay.

The impacts expected on recreational opportunities in the vicinity of the remote eggtake sites would be the same as those described in the Main Bay Alternative.

The impacts expected on recreational opportunities in the vicinity of the remote release sites would be less than those described in the Main Bay Alternative. Temporary camp tent sites would not be necessary under this alternative as fry would be released directly into lakes as opposed to smolt released into marine netpens. The impacts to recreation would be short term (1-3 days per release site annually) though varying dependant on the location of the remote release operation.

Currently there is some level of commercial fishing activities in the Coghill and Eshamy areas. If commercial fishing periods in these areas are extended in order to harvest enhanced sockeye salmon, there may be potential conflicts with recreational fishing activities. These conflicts would last only during the duration of commercial fishing openings.

Long-term and Cumulative Impacts

There would be a cumulative impact on the availability of fish for sports fishing. The Coghill River and Eshamy Lagoon are popular sports fishing areas, and the production of additional high value sockeye salmon would make more fish available.

Depending on the location of remote release lakes and terminal fishery sites, there may be cumulative impacts on non-fishery recreation uses such as sight seeing, power boating, sailing, kayaking, and hunting activities. These impacts could take the form of spatial displacement of the recreational user by the commercial fishing activities and degradation of wilderness and visual characteristics of the area. This would also be true to a lesser extent in the Coghill area, which has an existing commercial fishery as well as heavy recreation and tourism vessel use.

4.2.12 Subsistence

The issue that increased enhancement of sockeye salmon at the Esther Island Hatchery may cause a significant restriction of subsistence harvesting activities (Chapter 2) is addressed in this section. The evaluation of impacts addresses the potential effects of project alternatives on competition from nonsubsistence users, whether access for subsistence use would be reduced, or whether subsistence use would be impacted because the abundance of populations of subsistence resources may be reduced. A formal ANILCA Section 810 subsistence evaluation is included at the end of this section.

The activities of the Esther Island Hatchery Expansion Alternative that might have an effect on subsistence harvesting are limited to those associated with the harvest of returning salmon. The construction at the hatchery itself would have no effect on subsistence. The egg-taking activities will be conducted in accordance with regulations and ADF&G policies that will prevent any effect on the resource population, and the activities themselves will be so brief that no other effect on subsistence can be envisioned. The fry release into candidate lakes would be by float plane and would also have no effect on subsistence. The harvest of returning sockeye salmon at the fishing areas near the candidate release lakes is the activity that would bring the most people and equipment into the areas.

The subsistence evaluation includes an evaluation of the effects of the proposed action on subsistence, an evaluation of the availability of other lands for the proposed action, and an evaluation of the availability of alternative ways of implementing the proposed action which would reduce or eliminate the proposed action from lands needed for subsistence purposes. As stated in Chapter 2 of this document, the interdisciplinary team evaluated other means of meeting the purpose and need and found that with current technology, no reasonable alternative to

expansion or construction of hatcheries within Prince William Sound is available. They also evaluated 11 other hatchery sites as possible alternate locations and found that only one met the feasibility criteria of water supply and minimal interference with wild fish stocks.

The sections below address each sockeye salmon harvest location, including several candidate lake release sites. The evaluation is as site specific as possible and includes consideration of access, competition, and effects on populations of resource species.

4.2.12.1 Coghill

Tatitlek residents have used the coastline around the Coghill area (on both sides of Port Wells and College Fiord) (Map 3) to hunt marine mammals, and Port Wells for hunting deer (Stratton 1990). Draft ADF&G data indicate that Tatitlek households use the large area referred to as "Port Wells/College Fiord/Coghill" for marine mammal hunting, with 14 percent using the area regularly. Cordova residents use the Port Wells area for subsistence shrimp fishing, probably while commercial salmon fishing at Coghill (Stratton 1989).

In the mid-1980s, Chenega Bay households conducted some marine mammal hunting farther up College Fiord, and marine invertebrates were harvested at the mouth of College Fiord (Stratton and Chisum 1986). Draft ADF&G data mentioned in reference to Barry Arm applies to Coghill: Chenega Bay households use the Port Wells/College Fiord/Coghill area for salmon, waterfowl, and marine mammals, with six percent using the area regularly.

As commercial fishing already occurs in the Coghill area, the impacts of the proposed sockeye salmon release would likely conflict very little if at all with subsistence pursuits. Some of the current Chenega Bay subsistence use in the area is probably by people whose access is from commercial fishing boats, and that would only increase. The extended presence of fishermen could increase any displacement and/or diminishment of marine mammal populations caused by commercial fishing, thereby perhaps affecting slightly the subsistence marine mammal hunting.

A beneficial impact on subsistence would be the increased availability of sockeye salmon for subsistence use.

4.2.12.2 Main Bay/Eshamy

Chenega residents in the 1960s used the area around Main Bay (Map 3) for hunting deer (Stratton and Chisum 1986). In the late 1980s, Chenega Bay residents indicated they use the Knight Island/Dangerous Passage area mainly for salmon and marine mammals but also for other finfish, shellfish and waterfowl; 50 percent of Chenega Bay households said they used this area regularly, according to preliminary ADF&G estimates. One sub-area identified within the "Knight Island/Dangerous Passage" category was Eshamy. An estimated six percent of Cordova households used Eshamy for salmon fishing and marine mammal hunting on a regular basis. An estimated 17 percent of Chenega Bay households regularly use the Dangerous Passage/Whale Bay sub-area for salmon, 11 percent for finfish, six percent for shellfish, 17 percent for

waterfowl, 28 percent for marine mammals, and 39 percent for any resource. Preliminary data on the Knight Island Passage sub-area suggest that 11 percent of Chenega Bay households use this area for salmon, six percent for other finfish, waterfowl and marine mammals. Twenty-two percent of Chenega Bay households use this area for any resource on a regular basis. Knight Island (as a separate geographic category from the above area categories) is used by 50 percent of Chenega Bay residents on a regular basis for hunting deer (ADF&G unpublished draft data).

Mapped data on Tatitlek use of this area show that residents have used the area just south of the mouth of Main Bay (Stratton 1990). Draft ADF&G data estimated 18 percent of Tatitlek residents use the Knight Island/Dangerous Passage area for any resource, the main ones being salmon and deer (five percent each) and marine mammals (14 percent). Knight Island is used by an estimated 18 percent of Tatitlek households also, mainly for deer (14 percent) and marine mammals (nine percent) (ADF&G unpublished draft data). Cordova residents use the Eshamy area for subsistence shrimp fishing (Stratton 1989).

It is likely that a notable part of the subsistence harvesting in the area is by subsistence users who are also commercial fishermen. Their opportunities will not decrease and may increase because of the increase in sockeye salmon resulting from the hatchery expansion.

The pursuit of subsistence salmon in this area would be enhanced by the replacement of pink with sockeye salmon. On the other hand, increased presence of commercial fishing activity in this area could place pressure on the other resources local subsistence hunters obtain in this area, such as deer, marine mammals, shell fish and other finfish. The increased pressure on the resources would be from subsistence users and nonsubsistence users.

4.2.12.3 Esther Island

Esther Passage (Map 3) was used by Chenega Bay residents in the early 1960s for harvesting marine invertebrates (Stratton and Chisum 1986). No use of the Esther Island area was mapped for Chenega Bay residents in the mid-1980s; however, these maps were considered minimal estimates of use areas at a time when Chenega Bay residents had just moved to their new village site (Stratton and Chisum 1986).

Tatitlek residents have used Esther Passage also for marine invertebrates (crab). Draft ADF&G data on the percentage of Chenega Bay and Tatitlek households conducting subsistence harvests did not indicate Esther Island as a geographic category. It is unlikely that commercial fisheries enhancements on Esther Island would generate any significant impacts to subsistence pursuits.

<u>Summary</u>

The effect of replacing pink salmon with sockeye salmon likely would enhance subsistence fishing, in that subsistence users prefer sockeye salmon over pink salmon. Those subsistence users with commercial permits (or working as a crew member on a commercial fishing operation) likely would take sockeye salmon from the commercial harvest for home use.

Subsistence hunters believe that an increased stock of sockeye salmon would bring more seals, which are hunted for subsistence and are one of the favorite foods in Chenega Bay and Tatitlek. In addition to the positive effects on the resource availability, it is likely that little, if any change in subsistence versus nonsubsistence competition for the resources would occur. Access would also not change.

There is concern that an increased run of sockeye salmon would increase the level of commercial fishing activity and increase competition for various other subsistence resources. Competition for subsistence fishing is not seen as a problem; rather, competition for deer is the primary impact potentially arising from fishery enhancement (and, secondarily, conflicts with subsistence harvests of marine mammals and marine invertebrates, as well as possibly other species). If commercial fishing expands due to an increased sockeye salmon run, commercial fishermen may come to the area a little earlier. Commercial fishermen often hunt deer between fishing periods occurring after deer hunting season opens (August 1). This problem has actually occurred in the Chenega Bay area, associated with the larger purse seine fishery. In recent years, intense fishing in places such as Elrington Passage has been associated with a decline in the local deer population so that Chenega Bay people have had to rely on relatives in Cordova, for example, to supply meat. The remote release sites are all much farther from the subsistence communities than the Elrington Passage example, and a maximum of about one fourth of sockeye fishery would occur after August first. The proposed enhancement of the sockeye salmon fishery will also have the effect of spreading fishermen (and hunters) over more area, so one area does not get hunted as much. Therefore, the effect of nonsubsistence hunter competition with local subsistence hunters will be very small.

A second possible negative impact is that the increased amount of commercial fishing activity might disturb and displace seals and sea lions that subsistence hunters pursue in the areas affected. This impact will also be small because of the dispersed nature of the fishery and the distance from subsistence communities. Some hunters are reported to believe that an increase in sockeye salmon will attract more seals and sea lions and improve the hunting for marine mammals.

<u>Cumulative Impacts</u>

Cumulative impacts from other past, current, or reasonably foreseeable future actions combined with impacts from the proposed Ester Island hatchery expansion may be important. These impacts may extend to competition for resources other than salmon (e.g., deer). The main problem has occurred where hunting pressure has been concentrated in one area enough to reduce the deer population. While the proposed enhancement of the sockeye fishery may facilitate associated deer hunting during the part of the fishery that occurs after August first, it will add fish in areas already fished and potentially decrease the amount of free time available for hunting. Therefore, the cumulative effect should also be small. In addition, conflicts with subsistence harvests of marine mammals and marine invertebrates may occur, but would probably be little, if any, different than the current situation.

4.2.13 ANILCA Section 810 Subsistence Evaluation

Section 810 of ANILCA requires a Federal agency having jurisdiction over lands in Alaska to evaluate the potential effects of proposed land use activities on subsistence uses and needs. Section 810 of ANILCA states:

> In determining whether to withdraw, reserve, lease, or otherwise permit the use, occupancy, or disposition of public lands under any provision of law authorizing such actions, the head of the Federal agency having primary jurisdiction over such lands or his designee shall evaluate the effect of such use, occupancy, or disposition on subsistence uses and needs; the availability of other lands for the purposes sought to be achieved; and other alternatives which would reduce or eliminate the use, occupancy, or disposition of public lands needed for subsistence purposes. No such withdrawal, reservation, lease, permit, or other use, occupancy, or disposition of such lands which would significantly restrict subsistence uses shall be effected until the head of such Federal agency:
>
> 1. gives notice to the appropriate State agency and the appropriate local committees and regional councils established pursuant to ANILCA Section 805.
>
> 2. gives notice of, and holds, a hearing in the vicinity of the area involved; and
>
> 3. determines that (A) such a significant restriction of subsistence uses is necessary, consistent with sound management principles for the utilization of the public lands, (B) the proposed activity will involve the minimal amount of public lands necessary to accomplish the purposes of such use, occupancy, or other disposition, and (C) reasonable steps will be taken to minimize adverse impacts upon subsistence uses and resources resulting from such actions.

This section evaluates how the proposed action alternatives could affect subsistence resources used by the communities that currently and historically have used the project area for subsistence. The subsistence resource categories evaluated include deer, fish, marine mammals, marine invertebrates, and other subsistence resources. Criteria used to evaluate the effects of the proposed alternatives are (1) changes in abundance or distribution of resources used for subsistence, (2) changes in access to resources used for subsistence, and (3) changes in competition from nonsubsistence users for those resources. The evaluation determines whether subsistence uses in the project area may be significantly restricted by any of the proposed action alternatives.

The Alaska Land Use Council's definition of "significantly restrict subsistence use" is one guideline used in the findings. By this definition:

> A proposed action shall be considered to significantly restrict subsistence uses, if after any modification warranted by consideration of alternatives, conditions, or stipulations, it can be expected to result in a substantial reduction in the opportunity to continue subsistence uses of renewable resources. Reductions in the opportunity to continue subsistence uses generally are caused by: reductions in abundance of, or major redistribution of resources; substantial interference with access; or major increases in the use of those resources by non-rural residents. The responsible line officer must be sensitive to localized, individual restrictions created by any action and make his/her decision after a reasonable analysis of the information available.

The U.S. District Court Decision of Record in *Kunaknana v. Watt* provided additional definitions of "significant restriction of subsistence uses" that are also used as guidelines in the findings. The definitions from *Kunaknana v. Watt* include:

> Significant restrictions are differentiated from insignificant restrictions by a process assessing whether the action undertaken will have no or slight effect as opposed to large or substantial effects. In further explanation the Director (BLM) states that no significant restriction results when there would be "no or slight" reduction in the abundance of harvestable resources and no "occasional" redistribution of these resources.
>
> There would be no effect (or slight inconvenience) on the ability of harvesters to reach and use active subsistence harvesting sites; and there would be no substantial increase in competition for harvestable resources (that is, no substantial increase in hunting by [non-rural residents]).
>
> Conversely, restrictions for subsistence uses would be significant if there were large reductions in the abundance or a major redistribution of these resources, substantial interference with harvestable access to active subsistence sites or major increases in [...non-rural resident] hunting.
>
> In light of this definition, the determination of significant restriction must be made on a reasonable basis, since it must be decided in light of the total subsistence lands and resources that are available to individuals in surrounding areas living a subsistence lifestyle.

Resource Findings

The subsistence analysis in this EIS addresses the potential effects of project alternatives on competition from nonsubsistence users, whether access for subsistence use would be reduced, or whether subsistence use would be impacted because the abundance of populations of subsistence resources may be reduced. In addition to the evaluation of the effects of the proposed action alternatives on subsistence, an evaluation of the availability of other lands for the proposed action and an evaluation of the availability of alternative ways of implementing the proposed action which would reduce or eliminate the proposed action from lands needed for subsistence purposes has been included. As stated in Chapter 2 of this document, the interdisciplinary team evaluated other means of meeting the purpose and need and found that with current technology, no reasonable alternative to expansion or construction of hatcheries within Prince William Sound is available. They also evaluated 11 other hatchery sites as possible alternate locations and found that only the Main Bay expansion and the Esther Island expansion alternatives met the feasibility criteria of water supply and minimal interference with wild fish stocks.

Competition for subsistence resources from commercial fishermen was determined not to be a significant problem for several reasons. Many subsistence harvesters from Prince William Sound are also commercial fishermen, and their harvest would not be new competition from nonsubsistence users. This applies to all the resources used for subsistence. In addition, the new sockeye salmon runs would provide a preferred resource that would more than compensate for any effects of competition for fish that do occur. At remote release sites, fishing for the sockeye salmon will be continuous, leaving little idle time for pursuing other resources. The potential competition will be dispersed to several sites.

The abundance and distribution of subsistence resources will also not be significantly restricted by any of the alternatives. There will be no degradation of habitat that would reduce the populations of subsistence organisms, and the proposed activities will not cause the populations to be redistributed. The plan of the proposed action alternatives to disperse the harvest in both time and space will also help to minimize the effects on the abundance of the resources. Abundance of the total subsistence resources will increase because of the addition of the sockeye salmon.

Access to subsistence resources would not be significantly restricted by the proposed actions. Subsistence users aboard commercial fishing vessels will have access to some new areas, and access will be similar to before the proposed actions. Subsistence, sport, and commercial fishermen will all be attracted to the sockeye salmon. Because of the temporary nature of the fishing at any one site, the overall effect of commercial fishing on access by any other users will be for a short time and will be small.

The analysis (see pages 4-30 and 4-34) leads to the conclusion that the actions proposed in the Main Bay Hatchery Expansion Project alternatives will not present a significant possibility of a significant restriction on subsistence use of deer. There would likewise not be a significant possibility of a significant restriction on subsistence use of marine mammals, fish and shellfish,

or other subsistence resources. This is based on potential resource effects on abundance and distribution of resources, access, and competition. Restrictions of access will be limited to very small patches of open water for a very short time, and at the same time, access will become available to a new resource, the sockeye salmon. Competition will be primarily by the same people that compete now, but additional resources (the preferred sockeye salmon) will be more abundant. The finding also takes into consideration both direct and indirect impacts and cumulative impacts of the proposed action along with other activities in the project area. Additional details of the analysis are found in sections 4.1.12 and 4.2.12 of this EIS.

Draft EIS Conclusions

The potential foreseeable direct, indirect, and cumulative effects from the proposed action in the Main Bay Hatchery Expansion Project Area do not present a significant possibility of a significant restriction of subsistence uses of deer, marine mammals, fish and shellfish, or other resources used for subsistence. Because the DEIS conclusion is that the alternatives to the proposed action do not present a significant possibility of a significant restriction of subsistence uses, a section 810 "Tier II" analysis does not apply and the notice and hearing requirements are inapplicable.

4.3 THE NO ACTION ALTERNATIVE

4.3.1 Overall Impact

Under the No Action alternative, there would be no new construction at the Main Bay Hatchery or no demolition and re-construction at the Esther Island Hatchery. Both facilities would continue to function within the confines of their currently permitted activities.

The Main Bay Hatchery, which converted its production to exclusively sockeye salmon in 1987, would continue to produce approximately 5.1 million smolts. The eggtakes would continue at Eyak Lake, Coghill/Davis, and Eshamy lakes; and from the Special Harvest Area near the hatchery. After 1993, eggtakes would be no longer conducted at Eyak Lake. Eggs would continue to be incubated at existing facilities within the hatchery.

Fry at the Main Bay Hatchery would be freshwater reared and released at the hatchery as well as in the Coghill and Eshamy systems. Returning adults would be harvested for common property fisheries, cost-recovery fisheries, and for broodstock. Details of the hatchery plan are given in the 1992 Annual Management Plan.

The Esther Island Hatchery (WNH I and WNH II) currently produces pink, early chum, chinook, and coho salmon. The anticipated eggtake for 1992 includes 188 million pink salmon eggs, 111 million chum salmon eggs, one million chinook salmon eggs, and 2.5 million coho salmon eggs.

Pink and chum salmon fry would be reared for a short period (2-10 weeks) and released into saltwater. Coho and chinook salmon fry would be reared in indoor and outdoor raceways and held until the following spring. Returning adults would be harvested for common property fisheries, cost-recovery fisheries, and for broodstock. Details of the hatchery plan are given in the 1992 Annual Management Plan.

The No Action alternative would result in no loss of wetlands, and no additional loss of vegetation or existing fish and wildlife resources at either the Main Bay or Esther Island hatchery. Likewise there would be no additional impact to the hydrology, air and water quality, or to the existing wilderness character of the Nellie Juan-College Fiord Wilderness Study Area. There would be no additional impact to land ownership, land usage, management practices, or to existing recreation, tourism, or subsistence users.

Long-term and Cumulative Impacts

The No Action alternative of allowing the wild stocks to slowly rebuild would rely on only wild Coghill returning adult salmon to reestablish the run. Coghill Lake is the largest sockeye salmon nursery in the western portion of Prince William Sound and rehabilitation of this system will be for maintaining biodiversity, wilderness, and recreational values. Releases of Coghill smolt from the existing Main Bay facility into the Coghill system is currently ongoing as part of the cooperative Coghill rehabilitation project. This includes lake fertilization (Coghill Lake Fertilization EA, decision signed March 9, 1993), monitoring and hatchery supplementation involving ADF&G, the Forest Service and PWSAC. It is projected that smolt releases from Main Bay will cease in 1996.

4.3.2 Commercial Fisheries

4.3.2.1 Biology/Management

Under the No Action alternative, the Main Bay Hatchery would continue to produce approximately 5.1 million sockeye salmon smolt that would yield an estimated one million adult fish for the commercial and cost-recovery fishery. The Esther Island Hatchery would not switch production to sockeye salmon but would continue to annually produce an estimated 10 million pink salmon, 0.9 million chum salmon, 220,000 coho salmon, and 4,000 chinook salmon for harvest primarily by the seine fishery.

With no additional enhancement of sockeye salmon there would be no co-mingling of stocks and consequently no additional genetic interactions or food resource competition.

4.3.2.2 Economics

With the No Action alternative, the annual economic benefit to the commercial fishing industry and to hatchery cost recovery of the Main Bay Hatchery would remain at approximately $8.8 million annually.

The Esther Island Hatchery would continue to produce pink salmon for the commercial fishery and corporate cost recovery. Assuming a factor of 2.5 pounds per fish and a 1992 in-season price of $0.18 per pound, this would result in pink salmon landings worth $569,431 per year.

In general the No Action alternative would not result in any additional economic benefit to the commercial fishing industry and there would be no additional sport fishing opportunities. Also there would be no additional State and community tax revenue benefits nor any additional wage and salary benefits to allied industries.

4.3.3 Subsistence

Under the No Action alternative, subsistence activities would not be further affected, either positively or negatively.

4.4 SUMMARY OF ENVIRONMENTAL IMPACTS

As a summary to Sections 4.1, 4.2 and 4.3, Table 4-6 compares the environmental consequences associated with each alternative.

TABLE 4-6
SUMMARY COMPARISON OF THE ENVIRONMENTAL CONSEQUENCES OF THE ALTERNATIVES

Issue Topics	Main Bay Expansion Alternative	Esther Island Expansion Alternative	No Action Alternative
Vegetation and Wetlands Impacts	Approximately 8,660 square feet (0.20 acres) of wetlands will be filled.	Little or no vegetation would be removed. No wetlands would be disturbed.	No vegetation would be removed. No wetlands would be disturbed.
Fish and Wildlife Impacts	Small numbers of bear, deer, and birds may be displaced during construction and operation due to loss of habitat (8,660 square feet for Main Bay, no loss for Esther Island), noise and disruption during construction		No change
	Small numbers of pink salmon, resident fish (primarily Dolly Varden) and shoreline aquatic invertebrates may be affected by water level drawdowns on Main Lake and the Main River. 2.9 million additional returning hatchery sockeye annually after 2001.	Small numbers of resident fish (primarily Dolly Varden) and shoreline aquatic invertebrates may be affected by water level draw downs on Esther Lake. 843,000 returning hatchery sockeye annually after 2001.	Small numbers of pink salmon, resident Dolly Varden, and shoreline invertebrates may continue to be affected during low water years. About one million returning hatchery sockeye would continue at Main Bay.

Table 4-6
(Continued)

Issue Topics	Main Bay Expansion Alternative	Esther Island Expansion Alternative	No Action Alternative
Hydrology and Water Quality Impacts	Average estimated drawdown of 5.7 feet would likely occur. An additional 240 gallons per day of hatchery effluent would be discharged into Main Bay and Lake Bays.		No change Continue discharge of 1,950 gallons per day (gpd) for Main Bay and 650 gpd at Esther Island.
Air Quality and Noise Impacts	The operation of equipment, vehicles and increased use of diesel generators for backup electricity will cause localized air and noise pollution during the construction phase. The operation of skiffs and fixed-wing aircraft support during remote eggtake activities (under both action Alternatives) and during remote release operations (no skiff use under the Esther Island remote release plan) will cause localized air and noise pollution.		No change
Wilderness Impacts	Area governed by the provisions of the Wilderness Act and ANILCA, although a special use permit was issued for the existing facilities. Expanded operations would continue under this permit.	Hatchery expansion would not directly affect any existing or proposed wilderness, wilderness study areas, or other national conservation units.	No change

Table 4-6
(Continued)

Issue Topics	Main Bay Expansion Alternative	Esther Island Expansion Alternative	No Action Alternative
Wilderness Impacts (Continued)	Noise and activity during construction operations will intrude on the wilderness value of solitude in the surrounding wilderness study area. Fish harvest activities will affect solitude, inspiration, and primitive recreation opportunities, especially at Kings Bay and Barry Arm.	The increase in fish harvesting activities will affect opportunities for solitude, inspiration, and primitive recreation experiences at the harvest areas for the Coghill and Eshamy systems.	No change. Existing eggtake, smolt release, and harvest activities would continue with their effects on solitude, inspiration, and primitive recreation opportunities in the areas of the Coghill and Eshamy Lake systems
Visual Impacts	Construction activities and increased operations activities may be noticeable to boaters in Main Bay. Construction of a new water pipeline will be evident to back country users in the Main Lake area.	Construction activities and new structures would be visible to foreground views from boats and other users in Lake Bay.	No change
Cultural and Historic Resources Impacts	No archeological materials have been located at either hatchery site.		No change

Table 4-6
(Continued)

<table>
<tr><th>Issue Topics</th><th>Main Bay Expansion Alternative</th><th>Esther Island Expansion Alternative</th><th>No Action Alternative</th></tr>
<tr><td>Land Use Impacts</td><td colspan="2">Level of hatchery and support uses will increase associated with PWSAC cost recovery setnet fishing.

Increases in time spent at existing remote egg-take sites.

New land and water uses at six potential remote release sites.

Extension of existing commercial fishing periods (earlier openings).

Introduction of commercial fishing into Kings Bay, Nelson Bay and Barry Arm.</td><td>No change</td></tr>
<tr><td>Land Ownership Impacts</td><td colspan="2">No changes in existing inland ownership.

Modification to existing Special Use Permits.

State and Federal permits will be sought for the six potential remote release sites.</td><td>No change</td></tr>
</table>

Table 4-6
(Continued)

<table>
<tr><th>Issue Topics</th><th>Main Bay Expansion Alternative</th><th>Esther Island Expansion Alternative</th><th>No Action Alternative</th></tr>
<tr><td>Land Management Impacts</td><td colspan="2">Increased level of human activities at the hatcheries and in Main and Esther Bays due to earlier returns in hatchery fish.

Remote eggtake areas would remain the same, though time spent per location may be extended.

Extended commercial fishing periods in Coghill, Eshamy and Port Chalmers.

Fisheries management changes may be necessary for Kings Bay, Barry Arm, and Nelson Bay under both alternatives.</td><td>No change</td></tr>
<tr><td rowspan="2">Socio-economic Impacts</td><td>Temporary employment of approximately 20 construction jobs will generate approximately $3.7 million in temporary wages.</td><td>Temporary employment of approximately 9 construction jobs will generate approximately $1.8 million in temporary wages.</td><td rowspan="2">No change</td></tr>
<tr><td colspan="2">Permanent employment at each hatchery will increase by one employee, and two seasonals at the remote sites generating approximately $55,200 in annual payrolls.</td></tr>
<tr><td>Commercial Fisheries Impacts</td><td>Increased hatchery production will result in an estimated $18.5 million to the fish harvesting sector and potentially $12.4 million in gross revenues for area fish processors.</td><td>Increased hatchery production will result in an estimated $5.2 million to the fish harvesting sector and potentially $3.5 million in gross revenues for area fish processors.</td><td>No change</td></tr>
</table>

Table 4-6
(Continued)

Issue Topics	Main Bay Expansion Alternative	Esther Island Expansion Alternative	No Action Alternative
Commercial Fisheries Impacts (Continued)	Construction expenditures are estimated at $20 million of which some portion will be spent in local communities.	Construction expenditures are estimated at $9.6 million of which some portion will be spent in local communities.	No change
	State raw fish tax would generate approximately $560,000 assuming price paid to fisherman.	State raw fish tax would generate approximately $156,000 assuming price paid to fisherman.	
	2.9 million returning sockeye annually after 2001 may return. $26.3 million in annual benefits assuming a factor of 6.1 pounds per sockeye and a price of $1.45 per pound.	843,000 thousand returning sockeye annually after 2001 may return. $7.4 million in annual benefits assuming a factor of 6.1 pounds per sockeye and a price of $1.45 per pound.	
Recreation and Tourism Impacts	Extended commercial fishing periods, eggtake activities, and introduction of commercial fishing to new areas may cause spatial use and harvest conflicts in the vicinity of hatcheries and remote-release sites. Increased harvest activities may temporarily displace some tour boat and primitive recreation users.		No change
	Additional sockeye salmon availability at hatcheries and remote-release sites may promote additional boating and sports fishing opportunities.		No change

Table 4-6
(Continued)

Issue Topics	Main Bay Expansion Alternative	Esther Island Expansion Alternative	No Action Alternative
Subsistence Impacts	Not a significant possibility of a significant restriction of subsistence use.	Not a significant possibility of a significant restriction of subsistence use.	Not a significant possibility of a significant restriction of subsistence use.

APPENDIX 1-1

PERMIT REQUIREMENTS

The expansion of the Main Bay Hatchery and the demolition and re-construction of portions of the Esther Island Hatchery will require a variety of federal and state permits. These permits would be required to cover various construction activities, such as dredging and filling, as well as hatchery operation, such as eggtakes and waste water disposal. The following is a listing of the permits that would be required to construct and operate the hatcheries under both action alternatives.

Agency Granting Permit/Approval	Permit/Approval
U.S. Environmental Protection Agency	Consolidated Permit Form 1
U.S. Environmental Protection Agency	Aquatic Animal Wastewater Disposal Permit Form 2B
U.S Army Corps of Engineers	Section 404, Clean Water Act Permit
Federal Energy Regulatory Comm.	Electric Power Generation Permit
Alaska Office of the Governor Div. of Gov. Coordination	Certificate of Consistency and Reasonable Assurance
Alaska Dept. of Fish and Game	General Waterway/Waterbody Habitat Permit
Alaska Dept. of Fish and Game	Anadromous Fish Protection Permit
Alaska Dept. of Fish and Game	Special Use Permit (to place structures in streams)
Alaska Dept. of Fish and Game	Fish Transport Permits
Alaska Dept. of Fish and Game	Permit to Use Explosives
Alaska Dept. of Environmental Conservation Div. of Environmental Health	Wastewater Disposal Permit
Alaska Dept. of Environmental Conservation Div. of Environmental Health	Permit to Construct Food Service Operation

Alaska Dept. of Environmental Conservation Div. of Environmental Health	Food Service Application
Alaska Dept. of Environmental Conservation Div. of Environmental Health	Plan Review Application for Building Construction Permit
Alaska Dept. of Environmental Conservation	Main Bay Fish Hatchery Permit
Alaska Dept. of Environmental Conservation	Solid Waste Disposal Permit
Alaska Dept. of Environmental Conservation	Permit to Revise Fish Hatchery
Alaska Dept. of Environmental Conservation	Certificate of Consistency & Reasonable Assurance
Alaska Dept. of Natural Resources	Revision to Water Use Permit- DNR Form 10-102
Alaska Dept. of Natural Resources	Revision to Water Rights Permit
Alaska Dept. of Natural Resources	Dam Safety Certificate of Approval
Alaska Dept. of Labor M & E Division	Mechanical & Plumbing Permit and Inspection
Alaska Dept. of Labor M & E Division	Electrical Construction Permit and Inspection

APPENDIX 1-2

INDIVIDUALS ON MAILING LIST

MS. LAURI ADAMS
MS. MARLA JEAN ADKINS
MS. BETTY ADLES
MR. STEPHEN AMENDOLA
MR. JOHN VAN AMERONGEN
MR. LARRY ANDERSON
MR. M.B. ANDERSON
MR. GREG ANDERSON
MR. THOMAS ARMSTRONG
MR. DAVID ARNELL
MS. PEGGY ARNESS
MR. PIERRE H. AUTHIER
MS. BONNIE BAIZE
MR/S. BRUCE AND IRENE BAKER
MR. STEVE BANSE
MS. EMILY BARNETT
MR. MARK BARTHOLOMEW
MR. KEITH BAUER
MR. ROBERT BAUER
MR. MICHAEL BAVERS
MS. SHIRLEY BAYSINGER
MS. PAT BECKLEY
MR/S. MELVIN AND RUTH BEETS
MR. GREG BELL
MR. EUGENE BENNETT
MR. GARY BENOIT
MS. MARGARET BENSON
MR. MATT BERMAN
MR. FLOYD BETTIS
MS. PATTY BIELAWSKI
MR. PETER BIESIOT
MS. NANCY BIRD
MR. REX BISHOPP
MS. BOBBY BLACKNEY
MR. DANIEL BLAKE
MR. DAVE BLANCHET
MR. GARY BLOOM
MR. ED BOSCO
MS. BARBARA BOWERS
MR. DAVE BRANN
MR. ALLAN BREITZMAN
MS. JUDITH BRENDEL
MS. PAT BRESITE
MR. TOM BRIGHAM
MR. NORMAN BRISTOW
MR. GERALD BROOKMAN
MR. HARLEY BROTHERTON
MR. ROBERT BROWN
MR. GREG BROWN
MR. JOHN BUGLI
MS. SALLI BURGIN
MR. ROGER BURNSIDE
MR/S. KEITH AND JACKIE CAMPBELL
MS. DERAH CARLSON
MR/S. JAMES AND DEBRA CARLSON
MR. W.D. CARPENTER
MR. JIM CARTER
MR. GALEN CAUDILL
MR. RONNIE CHAPPELL
MS. DONNA CHERRIER
MR. ROBERT CHOUINARD
MS. LYNN CHRYSTAL
MR. J.J. CINCOTTA
MR. D. CLINE
MR/S. JOHN AND ALICE COLEMAN
MR. RALPH COMELLAS
MRS. J. KENNETH CONDIT
MR. DON CONRAD
MS. APRIL COOK
MR. TOM COOPER
MS. CAROLYN CORDER
MR. COSENTINO
MR. PAUL COSTELLO
MR. BEN COWART
MR. C. DEMING COWLES
MR/S. HARRISON AND VIRGINIA CRITES
MR. ROBERT CROCKETT
MR. WAYNE CROUCH
MS. DIANNE CUNNINGHAM
MR. MARK DALTON
MR. WILLIAM DAWSON
MR/S. RICHARD AND NANCY DEBUSMAN
MR. RAY DEFRANCE
MR. ARLAN DELONG
MR. WHITEY VAN DEUSEN
MR. STEVE DIKE
MR. SAM MC DOWELL
MR. ERIC DOWNEY
MS. REGINA DOYLE
MS. ELEANOR DUDLEY
MS. VERONICA DUKE
MR. BILL DUNLEVY
MR. LAWRENCE DUNLEVY
MR. DONALD DUNN
MR. MIKE DUNN
MR. BRIAN DUNNE
MR. GREG DUROCHER
MR. JAMES DYE
MR. CLIFF EAMES
MR. DAVID EARL
MR. HAROLD EDDINS
MR. CARL EHELEBE
MR. HARALD EHLERS
MR. BILL ELGE
MR. WILLIAM E. ELGE
MR. CHARLES ELLIS
MR. GERRY ENGEL
MR. W. ENZLER
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MR. LOWELL FERGUSON
MR. DON FINNEY
MR. MATTHEW FISHEL
MR. KEN FLOREY
MR/S. MILO AND WINIFRED FLOTHE
MR. CLARK AND DONALD FOLLOWS
MR. DON FORD
MR. ALBERT FRANZMANN
MR. B. FREDERICA
MR. ANDY FRENCH
MS. VICTORIA FRIEDMAN
MR. HAROLD FULLER
MR. MARK GAEDE
MR. JAMES GANNAWAY
MR. JOHN GANTENBEIN
MR. GATES
MR. MIKE GLASEN
MR. MIKE GOPHARDT
MR. RICHARD GORDON
MR. ALLAN GRANT
MR. GORDON GREBE
MS. LUCY GROH
MR. FREDERICK HAAS
MR. ROGER HACKETT
MR. STEVE HACKETT
MR. D. ROBERT HAKALA
MR. DUANE HALLMAN
MR. JIM HALLORAN
MR. BRUCE HAMLER
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MS. SHEILA EVANS HANSON
MR/S. DAVID AND SHIELA HANSON
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MR. ROBERT HARVEY
MR. ERIC HAVELOCK
MR. TOM HAWKINS
MS. HAZEL HEATH
MR. HEHNLIN
MR. JOHN HENDERICKS
MS. RITA HENDRICKSON
MR. TOM HENRY
MRS. MARK HICKOCK
MS. VIRGINIA HILLIKER
MR. MELVIN HISLOP
MR. WAYNE HITCHINGS
MR. KIRK HOESSLE
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MS. ELLY HULT
MR. DEAN IOSDICK
MS. SHARON IRVIN
MR. BRUCE JAFFA
MR. LONE JANSON
MS. KAREN JETTMAR
MR. NEIL JOHANNSEN
MR. LAURENCE JOHN
MR. MITCHELL JOHNSON
MR. LLOYD JOHNSON
MR. MARK JOHNSON
MS. AVA JOHNSON
MR. GARY JOKELA
MR. PERLEY JONES
MR. DEERING JONES
MR/S. ALLAN AND DIANNE JONES
MR. GENE JORGENSEN
MR. JOSEPH DESMIDT JR.
MS. LINDA JUSTA
MR. PETER KALBERG
DR. ROBERT KESLING
MR. KEVIN KNOTEK
MR. KEN KNUDSEN
MR. GERALD KOENIG
MR. CHARLES KONIGSBERG
MR/S. HARRY AND PAULINE KOWALKE
MR/S. HENRY AND MARY KROLL
MR. TOM KRON
MR. DON LAMOREAUX
MR. KEN LANCASTER
MS. BETTIE LANDE
MR. BOB LANGBERG
MS. JUANITA LARSON
MS. MARIE LASTUFKA
MR. KEN LEADERS
MR. STAN LEAPHART
MR. ROBERT LEARY
MR. CHARLES LEDBETTER
MR. KHOI M. LEE
MS. DOLLY LEFEVER
MR. STAN LEMAS
MS. MEG LEONARD
MR/S. JIM AND NANCY LETHCOE
MR. DUANE LEVAN
MR. SAM LIGHTWOOD
MR. MICHAEL LINDEMAN
MR. DEAN LITTLEPAGE
MR. ROBERT LOGAN
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MR. TIM LOPEZ
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MR. CHUCK LUKEY
MR. JIM LUKIN
MR/S. HOWARD AND BETTY LUTHER
MR. RICHARD LYNCH
MR. TIM MACMILLAN
MR/S. STEVEN AND LINDA MACSWAIN
MR. BRENT MAHAN
MR. DRU MALONE
MS. MIKE MARKERS

MR. RICK MARON
MR. ROBERT D. MARTIN
MS. JUDY MARTIN
MR. RICHARD MAUER
MR. R. MAULDIN
MR. RON MCALPIN
MR. DAVE MCCARGO
MR. RAYMOND MCCAULEY
MR. VIRGIL MCCONNELL
MR/S. DON AND PHYLLIS MCCRAY
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MS. SHERRY MCGUINESS
MR. JAMES MCINTOSH
MS. LORNA MCINTURFF
MR. PAUL MCLAUGHLIN
DR. WILLIAM MCNEILL
MR. RAY MCNUTT
MR/S. RICHARD & MELANEY MCVEIGH
MR. TOM MEACHAM
MR. CRAIG MEDRED
MR. KEVIN MELLING
MS. VIVIAN MENDENHALL
MR. WILLIAM METZ
MR. LEE MILLER
MR. ERNEST MILLER
MR. PETER MJOS
MR. TIM MOFFAIT
MS. MARGARET MOORE
MR. RON MOORE
MR. JEFF MOORE
MS. MARLENA MOORING
MS. MARY MORE
MR. DENNIS MORFORD
MR/S. MARGARET & DWAYNE MORGAN
MR. MORRIS MORGAN
MR. WILLIAM MORTERUD
MR. CLAYTON MORTILY
MR. JACK MOSBY
MR. RICHARD MUSGROVE
MR. DAVID NANCE
MR. ROBERT NESVICK
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MS. JOYCE OLSEN
MS. JANICE OLSEN
MR. MICHAEL OWECKE
MS. MONA PAINTER
MR. MARK PARR
MR. AL PEDERSEN
MR. RICHARD PERSON
MR/S. DARWIN AND ANDY PETERSON
MR. JIM PETERSON
MR. JOHN PEZZENTI
MR. REID PFANMILLER
MR. PETE PFEFFER
MR. FRITZ PFISTERER
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MR. DALLAS PITZNER
MR. STEVE PLANCHON
MR. RALPH PORTER
MS. BONNIE POWELL
MS. EILEEN PRUITT
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MR/S. JOHN AND CAROLYN RADER
MR. MATTHEW RADER
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MRS. HELEN RHODE
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MR. JOHN SISK
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MR. DON SUTHERLAND
MR. JOHN SWANSON
MR. BRICE SWANSON
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MR. EDWARD TATARKA
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MR. LEO THOMPSEN
MR. STAN THOMPSON
MR/S. TONY THOMPSON
MS. SARA THRAPP
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MR. TERRY WINDECKER
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MR/S. JAMES AND SUZANNE WOLCOTT
MR. JAMES WONG
MR. LARRY WOODS
MR. KEN WYRICK
MR. TOM YEAGER
MR/S. ELDON AND MARITA YOUNG
MR. MERRY ZOGAS

ORGANIZATIONS AND BUSINESSES ON MAILING LIST

ALASKA CENTER FOR THE ENVIRONMENT
ALASKA FEDERATION OF NATIVES
ALASKA FISHERMANS JOURNAL
ALASKA GOOD SAM CLUB
ALASKA HELICOPTERS, INC.
ALASKA LAND USE COUNCIL
ALASKA LOGGERS ASSOCIATION
ALASKA NATIONAL RESOURCES CENTER
ALASKA OIL & GAS ASSOCIATION
ALASKA OUTDOOR ASSOCIATION
ALASKA OUTDOORS COUNCIL
ALASKA PACIFIC INDUSTRIES
ALASKA PACIFIC VENTURES
ALASKA PROFESSIONAL HUNTERS ASSN.
ALASKA SPORTFISHING ASSOCIATION
ALASKA SURVIVAL
ALASKA TREK N VOYAGES
ALASKA WATERFOWL ASSOCIATION
ALASKA WILDERNESS COUNCIL
ALASKA WILDLIFE ALLIANCE
AMERICA NORTH INC.
AMERICAN ALPINE CLUB, ALASKA CHAPTER
AMERICAN WILDERNESS ALLIANCE
ANCHORAGE ADVISORY COMMITTEE
ANCHORAGE AUDUBON SOCIETY
ANCHORAGE CONVENTION & VISITORS BUREAU
ANCHORAGE DAILY NEWS
ANCHORAGE VICINITY ORV
ANGLING ADVENTURES
ARKTOS ASSOCIATION
ASCS
ASSOCIATED PRESS: ANCHORAGE,
BACK COUNTRY BUILDERS OF ALASKA
BACK TRAILS AND BREAD
BACKCOUNTRY ALASKA
BOY SCOUTS OF AMERICA
BP EXPLORATION (ALASKA)
CHALLENGE ALASKA
CHUGACH ALASKA CORP.
CHUGACH EXPRESS DOG SLED TOURS
CHUGACH GEM & MINERAL SOCIETY
CHUGACH LOGGERS ASSOCIATION
CHUGACH SCHOOL DISTRICT
CITIZEN'S ADVISORY COMM. ON FED. AREAS
COMMERCIAL FISHERMEN OF COOK'S INLET
COMMONWEALTH NORTH
COMSET FISHERIES
COOK INLET REGION, INC.
COOPER LANDING COMMUNITY CLUB
COOPER RIVER/PWS ADVISORY COMMITTEE
COPPER VALLEY VIEWS
CORDOVA CHAMBER OF COMMERCE
CROW CREEK, INC.
CROWLEY MARITIME CORP.
DENALI CITIZENS COUNCIL
EXXON USA
EYAK CORPORATION
GARY KINGS
HATFIELD MARINE CENTER
IRA COUNCIL
IZAAK WALTON LEAGUE
JAMES M. MONTGOMERY CONSULTING
KNIK CANDERS & KAYAKERS, INC.
KUBICK ENTERPRISES
LAND USE PLANNING ADVISORY COMM.
LANE INVESTMENTS
MARINE ADVISORY PROGRAM
MCKINLEY MOUNTAIN MUZZLE-
MOOSE PASS SPORTMEN'S CLUB
MOUNTAIN CLUB OF ALASKA
MOUNTAINEERING CLUB OF ALASKA
MUZZLE LOADING RIFLE CLUB
NATIONAL AUDUBON SOCIETY
NATIONAL BANK OF ALASKA
NATIONAL OUTDOOR LEADERSHIP SCHOOL
NATIONAL WILDLIFE FEDERATION
NATIONAL WILDLIFE REFUGE ASSN. AK
NINILCHIK NATIVES ASSOCIATION
NORTH GULF OCEANIC SOCIETY
NORTH PACIFIC RIM
NORTH STATE LANDSCAPING
NORTHERN ALASKA ENVIRONMENTAL CENTER
ORGANIZATION OF MGMT. OF AK RESOURCES
OSPREY OUTFITTERS
PARKS AND RECREATION COUNCIL
PRINCE WILLIAM SOUND USERS ASSOCIATION
RECREATIONAL EQUIPMENT, INC.
SHELL WESTERN E. & P., INC.
SIERRA CLUB
SIERRA CLUB LEGAL DEFENSE FUND
SOUND USE OF PUBLIC RESOURCES
SOUTH CENTRAL TIMBER DEVELOPMENT, INC.
SOUTHEAST ALASKA CONSERVATION COUNCIL
SUNSHINE SPORTS
TATITLEK CORPORATION
THE NATURE CONSERVANCY
THE NORTH PACIFIC RIM
THE WILDERNESS SOCIETY
TRAILS NORTH, INC.
TROUT UNLIMITED
TRUSTEES FOR ALASKA
UNIVERSITY OF ALASKA - FAIRBANKS
VALDEZ HARBORMASTER
VALDEZ VANGUARD
WHITTIER CHAMBER OF COMMERCE
WHITTIER, CITY OF
WHITTIER PUBLIC LIBRARY
WILDERNESS OUTFITTERS
WILLIAM H. SEWARD YACHT CLUB
YUKON HELICOPTERS

MUNICIPAL, STATE, AND FEDERAL AGENCIES ON MAILING LIST

ALASKA DEPARTMENT OF COMMERCE & ECONOMIC DEVELOPMENT
ALASKA DEPARTMENT OF COMMUNITY & REGION AFFAIRS
ALASKA DEPARTMENT OF ENVIRONMENTAL CONSERVATION
ALASKA DEPARTMENT OF FISH & GAME - COMMERCIAL FISHERIES
ALASKA DEPARTMENT OF FISH & GAME - FRED DIVISION
ALASKA DEPARTMENT OF NATURAL RESOURCES
ALASKA DEPARTMENT OF NATURAL RESOURCES, DIV. OF PARKS & REC.
ALASKA DEPARTMENT OF NATURAL RESOURCES, OIL SPILL PROJ. COORD. OFF
ALASKA DEPT. OF NATURAL RESOURCES, DIV. OF LAND & WATER MGMT.
ALASKA DIVISION OF POLICY DEVELOPMENT & PLANNING
ALASKA DIVISION OF TELECOMMUNICATIONS
ALASKA OFFICE OF THE GOVERNOR
ANCHORAGE, MUNICIPALITY OF
ANCHORAGE WATERWAYS COUNCIL
ENVIRONMENTAL PROTECTION AGENCY
NATIONAL MARINE FISHERIES SERVICE - NOAA
NATIONAL PARK SERVICE
US FOREST SERVICE- CORDOVA RANGER DISTRICT
US FOREST SERVICE- SEWARD RANGER DISTRICT
US FOREST SERVICE- THORNE BAY RANGER DISTRICT

APPENDIX 2-1

STATE OF ALASKA

WALTER J. HICKEL, GOVERNOR

DEPT. OF ENVIRONMENTAL CONSERVATION

SOUTHCENTRAL REGIONAL OFFICE
3601 "C" STREET, SUITE 1334
ANCHORAGE, AK 99503

(907) 563-6529

CERTIFIED MAIL
RETURN RECEIPT
REQUESTED
P 054 972 167

April 19, 1993

Dan Warren
Prince William Sound Aquaculture Corp.
821 N Street, Ste. 101B
Anchorage, AK. 99501

Dear Mr. Warren:

Re: Wastewater Disposal Permit for the Main Bay Hatchery
ADEC Permit Number 9240-DB006-2E

The Department has completed its review of the subject Notice of Dispòsal which was received on 11/30/92 and the additional information submitted to this office dated 3/23/93. Authorization is hereby granted to conduct wastewater disposal activities as described in the Notice of Disposal. This approval is subject to the terms and conditions of General Permit Number 9240-DB006 and the facility specific conditions listed below and is valid for the time period from the date of this letter thru July 1, 1997. A copy of general permit 9240-DB006 is attached for your use.

This general permit has already been determined to be consistent with the Alaska Coastal Management Program provided the project is conducted in accordance with all applicable conditions of the general permit. This general permit appears on the general concurrence (B list) of the Classification of State Approvals.

Project specific conditions incorporated in this authorization are as follows:

1. Monitoring of hatchery wastes will be conducted at outfalls #1 & #2 as identified in the Notice of Disposal in accordance with Part III.A.1. of the general permit. Sampling will be conducted for the parameters total suspended solids, settleable solids and pH. The discharges from these outfalls compromise the total hatchery waste flow. Since there are two discharge points (incubation building and brood holding pond outfall pipes) the equations presented in section 9.4 of the <u>Notice of Disposal</u> and the water use tables contained therein will be used to calculate the final values for the parameters TSS and SS for purposes of permit

compliance.

2. Monitoring of domestic wastes will be conducted at a point following the chlorinator of the sewage treatment plant and prior to discharging in accordance with Part III.A.2. of the general permit. Sampling will be conducted for the parameters BOD_5, TSS, fecal coliforms, chlorine residual and pH. Engineering plan review and approval to operate for the drinking water and domestic wastewater systems shall be obtained from the Valdez Field Office of ADEC. Engineering plans must be prepared and stamped by an engineer registered in the State of Alaska.

3. Bottom samples will be taken under the rearing pens twice a year at five locations identified (n1-n5) in the letter to this office dated 3/23/93. Samples will be analyzed for accumulations and any observable effects upon the benthic community. A summary report will be submitted to the offices listed below, containing plan drawings of the pen rearing sites with sampling locations identified, by December 31 of each year in accordance with Part III.A.3. of the general permit.

4. The site for disposal of whole fish carcasses identified in the letter to this office dated 3/23/93 located near the mouth of Main Bay is approved. A log of each discharge occurrence, approximate location, date, and approximate weight will be maintained at the hatchery.

5. Monitoring results required in this authorization will be summarized monthly (in the case of hatchery wastes for the months May through October and quarterly for domestic wastes), on the forms in Appendix C, and submitted to the following offices of this department no later than 45 days following the specified sampling or 15 days after receipt of the laboratory results:

   Alaska Department of Environmental Conservation
   Southcentral Regional Office
   3601 C Street, Suite #1334
   Anchorage, Alaska 99503

   Alaska Department of Environmental Conservation
   Valdez Field Office
   Drawer 1709
   Valdez, Alaska 99686

Sample analysis required under this authorization may be conducted either at the hatchery facility or at an independent contract laboratory.

Please note that we have added a unique suffix designation to the general permit number for each specific authorization (i.e. 9240-DB006-2E). Please refer to this permit number and suffix for all correspondence and monitoring reports related to this authorization.

Please contact Robert Dolan at 563-6529, or the Valdez Field Office at 835-4698, if you have any questions or need additional information.

Sincerely,

Svend Brandt-Erichsen
Regional Administrator

RD/ji (SCRO/WWT)9240-006.-2E

ENCLOSURE

cc: (w/o enclosure)
Mat-Su District Office, ADEC
Dan Lawn, ADEC/Valdez Field Office
Brian Ritchhart, SSOE Inc.
Terry Ellison, ADG&G/FRED Division/Anchorage
Valerie Haney, EPA, Anchorage
Elaine Pistoresi, ADEC/SCRO

STATE OF ALASKA
DEPARTMENT OF ENVIRONMENTAL CONSERVATION

General Waste Disposal Permit
Fish Hatchery Discharges

PERMIT NO. 9240-DB006 Date: July 10, 1992

This General Waste Disposal permit is issued to persons responsible for the disposal of wastewater from fish hatcheries. This permit covers fish hatcheries that have a fish food budget of greater than 30,000 pounds per annum and discharge wastewaters to waters of the State.

To be eligible for this permit, the wastewater must be treated in accordance with the requirements in Appendices A, B, and C of this permit prior to the discharge.

The Department will require a person to obtain an individual permit where notification of intent to conduct activities under this general permit is not made; when the disposal does not meet the conditions of this general permit, contributes to pollution, causes an adverse impact on public health or water quality, or a change occurs in the availability of technology or practices for the control or abatement of pollutants contained in the disposal.

This permit is issued under provisions of Alaska Statutes 46.03, the Alaska Administrative Code as amended or revised, and other applicable State laws and regulations.

This permit is effective on issuance and expires July 1, 1997 unless superseded before that time by state certified EPA permit. It may be terminated or modified in accordance with AS 46.03.120.

July 27, 1992
Date Issued

Michael Menge, Director
Environmental Quality

APPENDIX A--OPERATION

I. NOTICE OF DISPOSAL

A. Applicants wishing to conduct disposal activities under this permit must submit a Notice of Disposal to the appropriate Regional Office at least thirty (30) days prior to the disposal activity. This notification must be a written notice of intent to operate under this permit. This notification must include the following information:

1. applicant's name, position, company, address, and phone number;

2. name and address of the owner of the facility, and name and address of the operator of the facility;

3. topographic map showing the exact location of the facility and the discharge point(s), and the direction and ultimate termination of the flow after discharge;

4. average and maximum daily flow rates of all discharges;

5. description of the treatment process of the domestic and non-domestic wastewater that includes a flow schematic;

6. list of pollutants known to be present in the domestic and non-domestic wastewaters;

7. list of any medications, drugs, disease control chemicals and disinfectants used within the hatchery along with method of application and intended treatment dosage that will be discharge to the waters of the State along with the Manufactures Material Safety Data Sheets (MSDSs);

8. stamped engineering plans if currently available for all wastewater discharges;

9. monitoring plan for facilities with multiple discharge points of hatchery wastes as required in Part III.A.1. if applicable;

10. bottom sampling plan required in Part III.A.3. if applicable;

11. mixing zone application required in Part III.A.2. if applicable;

12. a fish carcass disposal plan required in Part III.4. if applicable;

B. Applicants must have written approval from the Regional Administrator of the appropriate Regional Office before conducting disposal activities under this permit. The Department will, in it's discretion, deny use of the permit, attach or waive conditions to the approval as necessary.

II. SITE OPERATION

A. Solids, sludges, filter backwash, or other pollutants removed in the course of treatment or control of wastewaters shall be disposed of in a manner such as to prevent any pollutant from such materials from entering waters of the State.

B. The Permittee shall, at all times, properly operate and maintain all facilities and systems of treatment and control (and related appurtenances) which are installed or used by the Permittee to achieve compliance with the conditions of this permit. Proper operation and maintenance also includes adequate laboratory controls and appropriate quality assurance procedures.

C. There shall be no discharge of floating solids, garbage, grease, foam, oily waste or wastewater containing a visible sheen or which may produce a film, sheen or coloration on surface waters.

D. The discharge shall not cause contamination of surface or groundwaters, and shall not cause a violation of the Alaska Water Quality Standards (18 AAC 70).

E. The disposal shall not cause adverse effects on aquatic or terrestrial plant or animal life, their reproduction, or habitat.

III. LIMITATIONS AND MONITORING

A. Unless otherwise specified in this permit, during the period beginning on the effective date to the expiration date, the Permittee is authorized to discharge in accordance with the following limitations and monitoring requirements below:

1. HATCHERY WASTES--RACEWAY REARING

Effluent Characteristics	Effluent Limitation		Monitoring Requirements[1] Frequency	Sample Type[2]
	Monthly ave.	Daily max.		
Flow (gpd)			monthly	estimate or meter
Total Suspended[3] Solids (mg/l)	5.0	15.0	monthly(normal)[4] monthly(cleaning)[5]	composite composite
Settleable Solids[3] (ml/l)		0.2	monthly(normal)[4] monthly(cleaning)[5]	composite composite
pH[6] (range)	6.5 - 8.5		monthly	grab

[1]Seasonal sampling will be required for facilities with raceway rearing, samples will be collected in the months of May through October.

[2]For facilities with multiple discharge points of hatchery wastes, the applicant will submit a monitoring plan to this Department for approval with their Notice of Disposal. This plan will consist of a method (equation) for calculating a weighted discharge value for the parameters Total Suspended Solids (TSS) and Settleable Solids, this weighted value will be based upon the quantity of fish diet fed per water discharge outfall and will be representative of the total volume of solids discharged from the facility.

[3]Sampling location for facilities with settling ponds will be at the outlet of the pond. Sampling location for facilities without settling ponds will be at the most downstream point of the wastewater handling system that is reasonably accessible to facility personnel. Net difference values may be used to meet these parameter limitations if influent and effluent sampling is conducted and reported.

[4]Samples shall be taken monthly during "normal" hatchery operations. The TSS samples shall consist of at least four (4) grab samples taken at approximately two hour intervals during hatchery operating hours which will result in a composite sample representative of the discharge during normal operations.

[5]Samples shall be taken monthly during the "cleaning" operations.

1. For discharges directly from raceways, sampling shall occur during raceway cleaning operations. The TSS samples shall consist of at least four (4) grab samples taken at evenly spaced intervals during the cleaning period which will result in a composite sample representative of the discharge during the cleaning operations. Two (2) settleable solids grab samples shall be collected at least one (1) hour apart which will result in a composite sample representative of the discharge during cleaning operations.

2. For discharges from settling ponds the TSS and Settleable Solid samples shall be taken immediately following the cleaning of raceways and shall consist of a single grab sample.

[6]An alternative criteria of no variation greater than 0.5 standard pH units from natural conditions may be used to meet this effluent limitation if influent and effluent sampling is conducted and reported.

2. DOMESTIC WASTES, for discharges to surface water of the State, either marine or fresh.

Effluent[7] Characteristic	Effluent Limitation		Monitoring Requirements Frequency	Sample Type
	Monthly ave.	Daily max.		
Flow(gpd)	Shall not exceed design capacity		quarterly	estimate/ meter
BOD_5[8] (mg/l)	30	60	quarterly	grab
Total Suspended[8] Solids(mg/l)	30	60	quarterly	grab
Fecal Coliform[9] (FC/100ml)			quarterly	grab
marine water	14	43		
fresh water	20	40		
Chlorine Residual[10] (µg/l)	non-detectable[11]		quarterly	grab
pH[12](range)	6.5 - 8.5		quarterly	grab

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[7]Analysis for the effluent parameters listed below shall be performed in accordance with Standard Methods for the Examination of Water & Wastewater (American Public Health Association).

[8]Secondary effluent treatment standards for these parameters may be waived at the Department's discretion in accordance with 18 AAC 72.040(d), in no case will the Department permit domestic wastewater to be discharged with less than primary treatment, that is without settling by a septic tank. Written approval by the Regional Administrator is required for this waiver.

[9]The applicant shall apply to the Department for a mixing zone for fecal coliform bacteria in accordance with 18 AAC 70.032 when the discharge is to surface waters of the State, either fresh or marine, if disinfection of the effluent is not part of the treatment system.

[10]For those facilities that disinfect with chlorine.

[11]Based upon amperometric or DPD methods.

[12]An alternative criteria of no variation greater than 0.5 standard pH units from natural conditions may be used to meet this effluent limitation if influent and effluent sampling is conducted and reported.

3. PEN REARING

a. Facilities that pen rear fish shall conduct bottom sampling for fish and/or food waste below the pens for the life of this permit. A bottom sampling plan will be submitted to the Department for approval as part of the Notice of Disposal, this plan will consist of a minimum of five sampling points sampled twice per year, before and after pen rearing season. Samples will be analyzed for accumulations and any observable affects upon benthic community. A summary report will be submitted to this Department by December 31 of each year discussing the results of this bottom sampling program. Any relevant information gathered as a result of dive or video surveys conducted at the facility will be included in this report.

b. If as a result of the first two years of this sampling program no persistent accumulations are evident on a yearly basis, the bottom sampling program may be discontinued upon application by the Permittee and review by this Department. Written approval of the Regional Administrator is required for this waiver.

c. A Zone of Deposit (ZOD) is authorized by this permit in accordance with 18 AAC 70.033 for facilities that practice net pen rearing. The ZOD will be for persistent accumulations on the bottom of fish waste and/or food resulting from the rearing activity. The limits of the ZOD will be specified by the Department following a review of the information submitted by the Permittee as part of the bottom sampling program.

d. Exemption from the bottom monitoring requirement will be considered on a case-by-case basis where hydrologic conditions, previous observations or data can support a determination by this Department that no persistent accumulations will occur.

4. FISH CARCASS DISPOSAL

A fish carcass disposal plan will be submitted with the Notice of Disposal, this plan will consist of a bathymetric or topographic map showing the discharge location, a narrative discription concerning tides and currents in the area of discharge with supporting data, and an estimate of the maximum poundage discharged on any given day and the number of days the discharge is anticipated to occur per season.

a. WHOLE CARCASS DISPOSAL

1. MARINE WATER

i. The discharge must take place while the vessel is underway in marine water at least 50 fathoms deep and which is suitable for dispersing the carcasses. Waiver of the depth requirement for specific sites may be granted upon written approval of the Regional Administrator. The waiver request must contain adequate information to justify a decision by this Department, including but not limited to bathymetric data, average and maximum current speeds (estimates may be used) and any historical information concerning impacts from seafood wastes.

ii. Approval of each discharge site must be obtained from ADEC before the carcasses are dumped.

iii. The skipper of the discharge vessel must fill out a log of each discharge occurrence, approximate location, date, and approximate weight of waste discharged, this log will be maintained at the hatchery.

2. FRESH WATER

i. No discharges will be authorized to fresh waters within one mile upstream of any drinking water source.

ii. Freshwater discharge of carcasses will be considered based on site specific circumstances if there is no persistent accumulation of carcasses.

iii. Approval of each discharge site must be obtained from ADEC before the carcasses are dumped.

iv. A log must be kept of each discharge occurrence, approximate location, date, and approximate weight of waste discharged.

b. GROUND FISH WASTES DISPOSAL, this section will apply to facilities that construct an outfall pipe and discharge directly from the facility.

1. MARINE WATER

i. Ground fish wastes may be discharged only if they do not exceed 0.5 inches in any dimension.

ii. The discharge must take place in marine water which is suitable for dispersing the fish waste. Specific sites will be approved if dispersal is demonstrated to be adequate based upon local flushing currents, tidal action, bottom topography and confining land forms.

iii. Approval of each discharge site and outfall location must be obtained from ADEC prior to construction of the outfall pipe.

iv. The operator of the facility must maintain a daily log of each discharge occurrence and approximate weight of fish waste discharged.

v. A bottom sampling plan will be submitted to the Department for approval as part of the Notice of Disposal if fish grinding is currently used at the facility, this plan will consist of a minimum of three sampling points sampled twice per year, before and after carcass disposal season. Samples will be analyzed for fish waste accumulations and any observable affects upon benthic community. A summary report will be submitted to this Department by December 31 of each year discussing the results of this bottom sampling program. Any relevant information gathered as a result of dive or video surveys conducted at the facility will be included in this report. If in the future the disposal of ground fish carcasses is considered at a facility notification of this Department is required and the appropriate part of this section of the permit will become applicable.

vi. A Zone of Deposit (ZOD) is authorized by this permit in accordance with 18 AAC 70.033 for facilities that discharge ground fish via an outfall pipe. The ZOD will be for persistent accumulations on the bottom of ground fish waste. The limits of the ZOD will be specified by the Department following a review of the information submitted by the Permittee as part of the bottom sampling program.

2. FRESH WATER

i. Ground fish wastes may be discharged only if they do not exceed 0.5 inches in any dimension.

ii. No discharges will be authorized to fresh waters within one mile upstream of any drinking water source.

iii. Freshwater discharge of ground fish wastes will be considered based on site specific circumstances if it can be demonstrated to the Department satisfaction that there will be no persistent bottom nor incidential shoreline accumulations of fish wastes, or floating wastes on the water surface.

iv. Approval of each discharge site must be obtained from ADEC prior to construction of the outfall pipe.

v. A daily log must be kept of each discharge occurrence, approximate weight of fish waste discharged and any observed shoreline accumulations.

5. DRUGS, CHEMICALS, MEDICATIONS and Other Products

a. The discharge of tri-n-butyl tin is not authorized.

b. Only drugs, medications and disease control chemicals which are approved for hatchery use by the United States Food and Drug Administration (USFDA) or the United States Environmental Protection Agency (EPA) shall be used. Their use shall comply with the permitted uses and application practices given on the product labels.

c. The discharge of any drugs, chemicals or medications in toxic amounts to waters of the State is prohibited.

d. Should it be determined that such products are being discharged in toxic amounts, or are having a significant negative impact upon the receiving environment, this permit shall be modified to include appropriate limitations or other requirements.

e. Research use of chemicals must have prior written approval from the Alaska Department of Fish and Game, FRED Division, Fish Pathology Section.

B. If the Permittee monitors any effluent characteristic identified in this permit more frequently than required, the results of such monitoring shall be included in the calculation and the values reported in the monitoring report (Part IV.). Such increased frequency shall also be indicated.

C. Test procedures for the analysis of pollutants shall conform to methods cited in 18 AAC 70.020. The Permittee may substitute alternative methods of monitoring or analysis upon receipt of written approval from the Department.

D. All records and information resulting from the monitoring activities required by this permit, including all records of analyses performed, calibration and maintenance of instrumentation, recordings from continuous monitoring instrumentation, and any addition or modification of the facility, shall be retained at the facility for observation by the Department for three years. Upon request from the Department, the Permittee shall submit certified copies of such records.

IV. REPORTING

A. Monitoring results as required in Part III. shall be summarized as per the specified schedules contained in the cover letter attached to the permit for each individual facility (either monthly, quarterly or yearly as appropriate), cn the forms in Appendix C and submitted to the appropriate regional office no later than 45 days following the specified sampling or 15 days after receipt of the laboratory results:

Alaska Department of Environmental Conservation
Northern Regional Office
1001 Noble Street, Suite #350
Fairbanks, Alaska 99701
(907) 452-1714
FAX: 451-2187

Alaska Department of Environmental Conservation
Southeastern Regional Office
410 W. Willoughby Ave., Suite #105
Juneau, Alaska 99801
(907) 465-5350
FAX: 465-5362

Alaska Department of Environmental Conservation
Southcentral Regional Office
3601 C Street, Suite #1334
Anchorage, Alaska 99503
(907) 563-6529
FAX: 562-4026

Alaska Department of Environmental Conservation
Pipeline Corridor Regional Office
411 W 4th Ave., Suite #2-C
Anchorage, AK 99501
(907) 278-8594
FAX: 272-0690

B. The permittee shall maintain on-site a log of all uses of medications, drugs, disease control chemicals, and disinfectants. This log will be made available for inspection by Department personal and shall be retained at the facility for three years. Upon request from the Department, the Permittee shall submit certified copies of such records. This log shall include the following:

1. Person responsible for the administration of the chemicals.

2. The trade name and purpose of the applied chemical.

3. Date, time, and pond or raceway being treated or disinfected.

4. Pond or raceway treatment concentration of the active ingredient, duration of treatment, and amount in gallons or pounds of the chemical used.

C. The permittee shall maintain on-site a log showing the method, date(s), location(s) and approximate weight of fish carcasses disposed of (as appropriate).

D. If the Permittee does not comply with or will be unable to comply with any effluent limitations specified in this permit due to equipment failures or facilitiy upsets, the Permittee shall report the noncompliance to the Department within 24 hours of becoming aware of such condition by telephone, telegraph, or in the absence of both, by mail. A written follow-up report shall be submitted to the Department within 7 days of the non-compliance. The report shall contain, but not be limited to:

1. Times and dates on which the event occurred and, if not corrected, the anticipated time the non-compliance is expected to continue;

2. a detailed description of the event including quantities and types of materials involved;

3. details of any damage to the receiving environment;

4. details of actions taken or to be taken to correct the causes of the event; and

5. details of actions taken or to be taken to correct any damage resulting from the event.

E. For purposes of this permit, a violation of this permit, or contamination of surface or groundwaters shall be defined as any of the following:

1. Discharging waste other than as authorized.

2. Discharging waste to an area other than as authorized.

3. Surface or groundwater levels exceeding levels specified in 18 AAC 70 (Water Quality Standards).

F. Termination of activities under this general permit. The Department will, in its discretion, require a person with a general permit to apply for an

individual permit when situations including, but not limited to, the following occur:

1. the disposal does not meet the conditions of the general permit;

2. the disposal contributes to pollution or causes an adverse impact on wildlife habitat, public health or water quality; or

3. a change occurs in the availability of technology or practices for the control or abatement of pollution contained in the disposal.

APPENDIX B--GENERAL CONDITIONS

I. Access and Inspection

The department's representatives shall be allowed access to the permittee's facilities to conduct scheduled or unscheduled inspections or tests to determine compliance with this permit and State laws and regulations.

II. Availability of Records

Except for information related to confidential processes or methods of manufacture, all application materials and records and reports submitted in accordance with the terms of this permit shall be available for public inspection at the department's Regional Office in which the permitted activity occurs.

III. Location of Permit and Application

The permittee shall maintain a copy of this permit and facility plans at the disposal facility or, if that is not feasible, at the permittee's or operator's place of business.

IV. Civil and Criminal Liability

Nothing in this permit shall be construed to relieve the permittee from civil or criminal penalties for noncompliance, whether or not such noncompliance is due to factors beyond his control, including but not limited to accidents, equipment breakdowns, or labor dispute.

V. Adverse Impacts

The permittee shall take all necessary means to minimize any adverse impact to the receiving waters or lands resulting from a violation or noncompliance with any limitations specified in this permit, including any additional monitoring needed to determine the nature and impact of the activity in noncompliance. The permittee shall clean-up and restore all areas adversely impacted by the noncompliance.

VI. Cultural or Paleontological Resources

Should cultural or paleontological resources be discovered as a result of this activity, work which would disturb such resources are to be stopped, and the Office of History and Archaeology, Division of Parks and Outdoor Recreation, Department of Natural Resources, is to be notified immediately (907)561-2020.

VII. Property Rights

The issuance of this permit does not convey any property rights in either real or personal property, nor does it authorize any damage to private property.

VIII. Modifications or Changes

Any alteration, installation, expansion or modification to the wastewater treatment facility must have written approval of the plans by the Department prior to construction. Proposed plans must be submitted for review at least 30 days prior to implementation of such changes.

IX. Applications for Permit Renewal, Amendment or Plan Approval

Application for a renewal of or amendment to a permit will be treated in the same manner as the initial application, except that public notice or hearing will not be required for applications for renewal or amendment. Application for renewal or amendment or plan approval must be made no later than 30 days before the expiration of the permit or the planned effective date of the amendment or change.

X. Transfers

Should operation of the facility be contracted or a change in contractors be made, the new contractor shall be notified of the existence of the permit and its conditions. A copy of the request shall be forwarded to the Regional Administrator of the appropriate Regional Office listed below.

XI. Termination

This permit terminates upon the expiration date. The department has the authority to terminate a permit upon 30 days written notice if the department finds that there has been a violation of the conditions of the permit.

DISCHARGE MONITORING REPORT - HATCHERY WASTES--RACEWAY REARING

Permittee Name/Address

Name: PWS Aquaculture Corp.
Address: 821 N Street, Ste. 101B
Anchorage, AK. 99501

Monitoring Period

From: ____/____/____
Yr. Mo. Day

To: ____/____/____
Yr. Mo. Day

Location: Main Bay Hatchery

PARAMETER		CONCENTRATION			UNITS	FREQUENCY OF ANALYSIS	SAMPLE TYPE
		MINIMUM	AVERAGE	MAXIMUM			
	Sample Measurement						
	Permit Requirement	NORMAL	NORMAL	NORMAL			
Flow	Sample Measurement						
	Permit Requirement			design capacity			
Total Suspended Solids	Sample Measurement						
	Permit Requirement		5.0	15.0	mg/l	monthly	composite
Settleable Solids	Sample Measurement						
	Permit Requirement			0.2	ml/l	monthly	composite
pH	Sample Measurement						
	Permit Requirement	6.5		8.5	std.	monthly	grab
		CLEANING	CLEANING	CLEANING			
Total Suspended Solids	Sample Measurement						
	Permit Requirement		5.0	15.0	mg/l	monthly	composite
Settleable Solids	Sample Measurement						
	Permit Requirement			0.2	ml/l	monthly	composite

Comment and Explanation of any violation:

Type or Print Name and Title of Principal Executive or Authorized Agent:

DATE: SIGNATURE:

DISCHARGE MONITORING REPORT - DOMESTIC WASTES

PARAMETER		CONCENTRATION			UNITS	FREQUENCY OF ANALYSIS	SAMPLE TYPE
		MINIMUM	AVERAGE	MAXIMUM			
Flow	Sample Measurement						estimate
	Permit Requirement			design capacity	gpd	quarterly	or meter
BOD_5	Sample Measurement						
	Permit Requirement		30	60	mg/l	quarterly	grab
Total Suspended Solids	Sample Measurement						
	Permit Requirement		30	60	mg/l	quarterly	grab
Fecal Coliforms Marine Water	Sample Measurement				FC/		
	Permit Requirement		14	43	100ml	quarterly	grab
	Sample Measurement						
	Permit Requirement						
pH	Sample Measurement						
	Permit Requirement	6.5		8.5	std.	quarterly	grab
Chlorine Residual	Sample Measurement						
	Permit Requirement			non-detect	µg/l	quarterly	grab
	Sample Measurement						
	Permit Requirement						

Comment and Explanation of any violation:

Type or Print Name and Title of Principal Executive or Authorized Agent:

DATE: SIGNATURE:

APPENDIX 3-1

APPENDIX TABLE 3-1

Species list of mammals whose range and habitat occur in western Prince William Sound. Additional species occur at higher altitudes in the Chugach Mountains. Species distribution taken mainly from Burt and Grossenheider (1964) and ADF&G (1973). Taxonomy follows Jones, et al., (1975) and Burt and Grossenheider (1964).

Common Name	Scientific Name
Masked shrew	Sorex cinereus
Dusky shrew	Sorex obscurus
Water shrew	Sorex palustris
Pygmy shrew	Microsorex hoyi
Little brown myotis	Myotis lucifugus
Snowshoe hare	Lepus americanus
Red squirrel	Tamiasciurus hudsonicus
Northern bog lemming	Synaptomys borealis
Tundra red-backed vole	Clethrionomys rutilus
Meadow vole	Microtus pennsylvanicus
Tundra vole	Microtus oeconomus
Alaska vole	Microtus miurus
Meadow jumping mouse	Zapus hudsonius
Porcupine	Erethizon dorsatum
Black bear	Ursus americanus
Marten	Martes americana
Least weasel	Mustela nivalis
Shortail weasel	Mustela erminea
Longtail weasel	Mustela frenata
Mink	Mustela vison
River otter	Lutra canadensis
Sea otter	Enhydra lutris
Wolverine	Gulo gulo
Coyote	Canis latrans
Gray wolf	Canis lupus
Red fox	Vulpes vulpes
Lynx	Felis lynx
Sea lion	Eumetopias jubata
Harbor seal	Phoca vitulina
Sitka black-tailed deer	Odocoileus hemionus sitkensis
Killer whale	Orcinus orca
Harbor porpoise	Phocaena phocaena
Dall porpoise	Phocaena dalli
Fin whale	Balaenoptera physalus
Minke whale	Balaenoptera acutorostrata
Humpback whale	Megaptera novaeangliae

APPENDIX 3-2

APPENDIX TABLE 3-2

Bird checklist - North Gulf Coast, Prince William Sound region. Primary preferences - XX; Secondary preferences - X; minor habitat utilization is not indicated, nor are preferences of species accidental to the region. Key: * Breeding record(s); = Probable breeding; + Possible breeding; Casual or accidental (Howse, 1975).

	Tundra	Shrub Thickets	Hemlock-Sitka Spruce Forest	Bogs	Mixed deciduous-spruce woodlands	Marsh	Lacustrine waters	Fluviatile waters	Cliffs, bluffs and screes	Moraines, alluvia, and barrier islands	Beaches and tidal flats	Rocky shores and reefs	Inshore Waters	Offshore waters
Common Loon							XX*						XX	X
Yellow-billed Loon													XX	X
Arctic Loon													XX	X
Red-throated Loon							XX*						XX	X
Red-necked Grebe													XX	X
Horned Grebe							XX*						XX	
Short-tailed Albatross														XX
Black-footed Albatross													X	XX
Laysan Albatross														XX
Fulmar													X	XX
Pink-footed Shearwater													X	XX
Pale-footed Shearwater													X	XX
Sooty Shearwater													X	XX
Slender-b Shearwater													X	XX
Scaled Petrel														XX
Forked-tailed Petrel									XX*				XX	XX
Leach's Petrel														XX
Double-c Cormorant							X		XX*			XX	XX	X
Brandt's Cormorant									XX*			XX	XX	
Pelagic Cormorant									XX*			XX	XX	X
Red-faced Cormorant									XX*			XX	XX	X
Great Blue Heron			XX*			X	X	X		X	XX	XX		
Whistling Swan						XX	XX	X			X		XX	
Trumpeter Swan						XX	XX*	X		X	X		X	
Canada Goose	X	X*	X*	XX		XX*	XX*	X		XX*	XX	X	X	X
Black Brant						X				X	XX	X	XX	XX
Emperor Goose						X				X	XX	X	XX	
White-fronted Goose						XX				X	XX	X	X	X
Snow Goose						XX				X	XX		XX	X
Mallard		X*		X		XX*	XX	XX		X	XX	X	XX	
Gadwall						XX*	XX	X			XX		X	
Pintail		X*				XX*	XX	X		X	XX	X	XX	X
Green-winged Teal		XX*	X*	X		XX*	XX	XX		X	XX	X	XX	
Blue-winged Teal						XX*					X		X	
European Widgeon*						XX							X	
American Widgeon						XX*	XX	X		X	XX	X	X	X
Shoveler						XX*	X	X		X	XX	X	X	
Redhead*						XX	X							
Ring-necked Duck						X	XX							
Canvasback						XX*	XX				X		X	
Greater Scaup						XX*	XX	X		X	XX	X	XX	
Lesser Scaup						X*	XX							
Common Goldeneye			X*				XX	X			X	X	XX	
Barrow's Goldeneye			XX*		XX*		XX	XX			X	X	XX	

APPENDIX TABLE 3-2 (Cont'd).

	Tundra	Shrub Thickets	Hemlock-Sitka Spruce Forest	Bogs	Mixed deciduous-spruce woodlands	Marsh	Lacustrine waters	Fluviatile waters	Cliffs, bluffs and screes	Moraines, alluvia, and barrier islands	Beaches and tidal flats	Rocky shores and reefs	Inshore waters	Offshore waters
Bufflehead			X*				XX	X			X		XX	
Oldsquaw							X*						XX	X
Harlequin Duck		X*	X*					XX		X	X	XX	XX	
Steller's Eider											X	X	XX	
Common Eider												X	XX	
King Eider												X	XX	
White-winged Scoter							X*				X	X	XX	X
Surf Scoter							X*				X	X	XX	X
Common Scoter											X	X	XX	X
Hooded Merganser							XX	X					XX	
Common Merganser		X*					XX	XX		X	X	X	XX	
Red-breasted Merganser						X*	X	X			X	X	XX	X
Goshawk		X	XX*		XX*	X					X			
Sharped-skinned Hawk	X	XX	XX*		XX*	X					X			
Red-tailed Hawk*					XX*									
Harlan's Hawk					XX*									
Rough-legged Hawk	XX*	X				XX				X				
Golden Eagle	XX								XX					
Bald Eagle	X		XX*		XX*	XX	X	XX	XX*	XX	XX	XX	X	
Marsh Hawk	X	X		X		XX*			XX*	X	X			
Osprey					X*	XX	XX	X					X	
Gyrfalcon	XX								X*		X			
Peregrine Falcon						X			XX*	X	X	X	XX	
Pigeon Hawk	X	XX	XX*		X	X					X			
Sparrow Hawk		X			XX	X								
Spruce Grouse		X	XX*		XX*									
Willow Ptarmigan	X	XX*	X	X	X	XX								
Rock Ptarmigan	XX*	XX	X						XX					
White-tailed Ptarmigan	XX*	XX							XX*					
Sandhill Crane	X					XX*				X	XX			
American Coot*						X	X						X	
Black Oystercatcher									XX*	X	X	XX		
Semipalmated Plover										XX*	X	X		
Killdeer*										XX	X			
American Golden Plover	X					XX				X	XX	X		
Black-bellied Plover						XX				X	XX	X		
Surfbird											X	XX		
Ruddy Turnstone										X	X	XX		
Black Turnstone										X	X	XX		
Common Snipe	X	X		XX*	X	XX*				X	X			
Whimbrel						X				X	XX	X		
Bristle-thighed Curlew*											XX			
Spotted Sandpiper						X	XX*			XX*	XX	X		
Solitary Sandpiper				XX		XX	XX				X			

APPENDIX TABLE 3-2 (Cont'd).

	Tundra	Shrub Thickets	Hemlock-Sitka Spruce Forest	Bogs	Mixed deciduous-spruce woodlands	Marsh	Lacustrine waters	Fluviatile waters	Cliffs, bluffs and screes	Moraines, alluvia, and barrier islands	Beaches and tidal flats	Rocky shores and reefs	Inshore waters	Offshore waters
Wandering Tattler	X*			X						XX*	X	XX		
Greater Yellowlegs				XX*		XX*	X			XX	XX	X		
Lesser Yellowlegs				XX*		XX*	X			XX	XX	X		
Knot										X	XX	X		
Rock Sandpiper											X	XX		
Sharp-tailed Sandpiper*						X					XX			
Pectoral Sandpiper						XX				X	XX	X		
Baird's Sandpiper						XX				X	XX			
Least Sandpiper				X		XX*	X			XX	XX	X		
Dunlin						XX				X	XX	XX		
Short-billed Dowitcher						XX*				X	XX	X		
Long-billed Dowitcher						XX				X	XX	X		
Semipalmated Sandpiper						XX				X	XX			
Western Sandpiper	X			X		XX*				X	XX	X		
Bar-tailed Godwit											XX			
Hudsonian Godwit						XX*				X	XX	X		
Sanderling										X	XX			
Red Phalarope											X	X	X	XX
Northern Phalarope				X		XX*	XX	X		X	XX	X	XX	XX
Pomarine Jaeger						X				X	X		XX	XX
Parasitic Jaeger				X		XX*				XX*	XX	X	XX	XX
Long-tailed Jaeger											X		XX	XX
Skua*													X	XX
Glaucous Gull						X		X		X	XX	X	XX	X
Glaucous-winged Gull						XX*	X	XX	XX*	XX*	XX	XX	XX	XX
Herring Gull						X*				X*	XX	XX	XX	X
Mew Gull			X*			XX*	X	XX	X	X*	XX	XX	XX	XX
Bonaparte's Gull			X*			X	X	X		X	XX	X	XX	X
Black-legged Kittiwake						X			XX*	X	XX	XX	XX	XX
Sabine's Gull											X		X	XX
Arctic Tern				X		XX*	X	X	XX*	XX*	XX	XX	XX	XX
Aleutian Tern						XX*				X	X		XX	X
Common Murre									XX*				XX	XX
Thick-billed Murre									XX*				XX	XX
Pigeon Guillemot									XX*			X	XX	X
Marbled Murrelet			X*						X*				XX	XX
Kittlitz's Murrelet									X*				XX	XX
Ancient Murrelet													XX	XX
Cassin's Auklet*													X	X
Parakeet Auklet									XX*				XX	X
Crested Auklet													X	XX
Rhinoceros Auklet									XX*				XX	
Horned Puffin									XX*				XX	XX
Tufted Puffin									XX*				XX	XX

APPENDIX TABLE 3-2 (Cont'd).

	Tundra	Shrub Thickets	Hemlock-Sitka Spruce Forest	Bogs	Mixed deciduous-spruce woodlands	Marsh	Lacustrine waters	Fluviatile waters	Cliffs, bluffs and screes	Moraines, alluvia, and barrier islands	Beaches and tidal flats	Rocky shores and reefs	Inshore waters	Offshore waters
Mourning Dove*						X					X			
Screech Owl*			X*											
Great Horned Owl		X	XX*		XX*	X			X					
Snowy Owl	X	X				XX			X	X		X		
Hawk Owl		X	XX*		XX*	X								
Pygmy Owl			X*											
Great Gray Owl			XX*		XX*									
Short-eared Owl	X	X		X		XX*				XX	X			
Boreal Owl		X	X		XX*									
Saw-whet Owl		X	XX*		X*									
Common Nighthawk*						X								
Anna's Hummingbird*														
Rufous Hummingbird		X	XX*		X									
Belted Kingfisher						X	X	XX	XX*	X	X	X	X	
Yellow-shafted Flicker			X		XX									
Red-shafted Flicker*					X									
Hairy Woodpecker			X		XX*									
Downy Woodpecker		X	XX*		XX*									
Black-backed 3-t Woodpecker*			X		XX									
Northern 3-t Woodpecker			X		XX*									
Say's Phoebe*	X								XX*					
Traill's Flycatcher		XX*	X		X	X								
Western Flycatcher*			X		X									
Western Wood Pewee					XX									
Olive-sided Flycatcher		X	X		XX									
Horned Lark	XX*						X							
Violet-green Swallow	X			X	X	XX	XX	X	XX*	X	XX		X	
Tree Swallow			X		XX*	XX	XX	X	X+	X	XX		X	
Bank Swallow						XX	X	X	XX*	X	X		X	
Barn Swallow						XX	X	X	XX*	X	X		X	
Cliff Swallow						XX	X	X	XX*		X		X	
Purple Martin														
Gray Jay		X	X		XX*									
Steller's Jay		x	XX*		X						X			
Black-billed Magpie	X	XX*	X	X	XX*	X			X	X	X	X		
Common Raven	X	X	XX*	X	XX	XX	X	X	XX*	X	XX	X	X	
Northwestern Crow			XX*		X	X			X	XX	XX	XX	X	
Black-capped Chickadee		X	X		XX*									
Boreal Chickadee		X			XX*									
Chestnut-b Chickadee		X	XX*											
Red-breasted Nuthatch		X	XX*		XX*									
Brown Creeper			XX*		XX									
Dipper							X	XX	XX*	XX				
Winter Wren		XX*	XX*		X									

APPENDIX TABLE 3-2 (Cont'd).

	Tundra	Shrub Thickets	Hemlock-Sitka Spruce Forest	Bogs	Mixed deciduous-spruce woodlands	Marsh	Lacustrine waters	Fluviatile waters	Cliffs, bluffs and screes	Moraines, alluvia, and barrier islands	Beaches and tidal flats	Rocky shores and reefs	Inshore waters	Offshore waters
Robin	X	XX*	XX*		XX*	X			XX*	X	X			
Varied Thrush	X	XX*	XX*	X	XX*	XX			X	X	XX	X		
Hermit Thrush	X	XX*	XX*	X	XX*	X			X	X	X	X		
Swainson's Thrush		X	X		XX*									
Gray-cheeked Thrush		X	X		XX*									
Wheatear	XX*													
Golden-crowned Kinglet		X	XX*		XX+									
Ruby-crowned Kinglet		XX	XX*		XX*									
Water Pipit	XX*			X		XX				XX	XX	X		
Bohemian Waxwing		X	X		XX*									
Northern Shrike	X	XX*	X		XX*	XX								
Starling											X			
Red-eyed Vireo														
Orange-crowned Warbler		XX*	XX*		XX*	X						X		
Yellow Warbler		XX*			X	X								
Myrtle Warbler		X	X		XX*									
Townsend's Warbler		X	XX*		XX*									
Blackpoll Warbler		X	XX*											
Northern Waterthrush		XX*			X									
Yellowthroat														
Wilson's Warbler		XX*	X		XX									
Red-winged Blackbird*		X				XX								
Rusty Blackbird		XX*	X	X	X	XX				X	X			
Common Crackle*														
Pine Grosbeak		X	XX*		XX*									
Gray-c Rosy Finch	X				X				XX*	X	X			
Hoary Redpoll		XX			X .	X								
Common Redpoll	X	XX*	X		XX*	X								
Pine Siskin		XX	XX*		XX	X								
Red Crossbill			XX*		XX+									
White-winged Crossbill			XX*		XX+									
Savannah Sparrow	XX*	XX*	X	X	X	XX*				X	X	X		
Slate-colored Junco	X	XX*	XX*		XX*	X								
Oregon Junco	X	X	XX*		XX*	X								
Tree Sparrow	X	XX*				X								
White-crowned Sparrow		XX*			XX	X								
Golden-c Sparrow		XX*	X	X	X	X						X		
White-throated Sparrow														
Fox Sparrow	X	XX*	XX*	X	XX*	X						X		
Lincoln's Sparrow	X	XX*		X	X	XX*								
Song Sparrow		XX*	X		X	XX*					XX	XX		
Lapland Longspur	XX*			X		XX				X	XX	X		
Snow Bunting	XX					X			XX*	XX	X	X		

APPENDIX 3-3

APPENDIX TABLE 3-3

Invertebrates of upper Prince William Sound (from Howse 1975).

Common Name	Phylum	Class
Sponges	Porifera	
Jellyfish	Coelenterata	Scyphozoa
Sea anemones		Anthozoa
Coral		Hydrozoa
Comb Jelly	Ctenophora	
Chitons	Mollusca	Amphineura
Abalones		Gastropoda
Limpets		
Periwinkles		
Moon shells		
Cowries		
Whelks		
Tooth shells		Scaphopoda
Bay mussels		Pelecypoda
Oysters		
Rock scallops		
Jingle shells		
Cockles		
Razor clams		
Little neck clams		
Butter clams		
Horse clams		
Soft shell clams		
Squid		Cephalopoda
Octopus		
Starfish	Echinodermata	Asteroipea
Brittle star		Ophiurodea
Sea urchins		Echinoidea
Sea cucumbers		Holothuroidea
Sea worms	Annelida	Polychaeta
Barnacles	Arthropoda	Crustacea
Isopods		
Amphipods		
Cladocerans		
Copepods		
Hermit crabs		
King crab		
Tanner crab		
Dungeness crab		
Horse crab		
Pink shrimp		
Coonstripe shrimp		
Pot shrimp		
Side stripe shrimp		
Humpy shrimp		
Sea squirt	Chordata	Tunicata

APPENDIX 3-4

Technical Report on the Wilderness and Visual Resources of Main Bay and Southern Esther Island, Prince William Sound, Alaska

by Greg Gault

WILDERNESS

Inventory

Main Bay Alternative - The Main Bay Hatchery is located on the western coast of Prince William Sound. The State of Alaska Department of Fish and Game constructed the existing hatchery facilities under a special use permit from the Chugach National Forest. The Prince William Sound Aquaculture Corporation (PWSAC) currently operates the Main Bay facility under lease from the State of Alaska.

The hatchery facilities are situated completely within the boundary of the Nellie Juan-College Fiord wilderness study area (WSA). This WSA was established on the Chugach National Forest by Section 701 of the Alaska National Interest Lands Conservation Act (ANILCA) of 1980. ANILCA directed that this WSA be managed in accordance with the Wilderness Act of 1964, except as otherwise provided for in ANILCA.

The legislative authority governing uses in a WSA and the current status of the Nellie Juan-College Fiord WSA in the wilderness review process, as related to the existing and proposed activities at the Main Bay fish hatchery, are described below.

The Wilderness Act states that wilderness areas "shall be administered for the use and enjoyment of the American people in such a manner as will leave them unimpaired for future use and enjoyment as wilderness." (P.L. 88-577). Through ANILCA, Congress made certain exceptions to the Wilderness Act that apply only to the management of wilderness areas and WSAs in Alaska. Section 1315(b) of ANILCA states,

> "...the Secretary of Agriculture may permit fishery research, management, enhancement, and rehabilitation activities within national forest wilderness and wilderness study areas designated by this Act."
>
> "Any fish hatchery, fishpass or other aquaculture facility authorized for any such area shall be constructed, managed, and operated in a manner that minimizes adverse impacts on the wilderness character of the area. Developments for any such activities shall involve those facilities essential to these operations and shall be constructed in such a rustic manner as to blend into the natural character of the area." (P.L. 96-487)

The existing Main Bay Hatchery facilities include a structure housing the hatchery and bunkhouse, three residences, a powerhouse, a shop building, a sewage treatment facility, and a small storage building. The hatchery/bunkhouse and residences are constructed from materials that tend to blend with the colors and textures of the natural landscape. Other modifications to

the area include a 30 inch water pipeline, docks, holding pens, and several ancillary structures. Though the colors and textures of the hatchery facilities are largely in keeping with the natural landscape, their forms tend to be out of place and inconsistent with the wilderness character of the surrounding area.

Float planes, motor-powered boats, diesel generating units, and other motorized equipment are used for the normal operations at the Main Bay Hatchery facilities. In addition, there are several short sections of gravel road at the hatchery site. ANILCA has made provisions for the use motorized vehicles in Section 1315(b), which states "Reasonable access solely for the purposes of this subsection, including temporary use of motorized equipment, shall be permitted...", subject to reasonable regulations and stipulations.

Although ANILCA makes certain exceptions to the Wilderness Act of 1964, it also states in Section 1315(a) that "Nothing in this section shall be construed to expand, diminish, or modify the provisions of the Wilderness Act...". This statement supports the provisions for preserving wilderness character and restricting certain uses in wilderness areas.

The wilderness review provision of ANILCA requires that the Secretary of the Agriculture conduct a review and make recommendations regarding the suitability or non-suitability of WSAs for the designation as wilderness, in accordance with the provisions in sections 3(c) and 3(d) of the Wilderness Act. Because of the presence of structures and roads, the portion of the Nellie Juan-College Fiord WSA that encompasses the Main Bay Hatchery was recommended as not suitable for wilderness designation by the Forest Service in the Chugach National Forest Plan (U.S. Dept. of Agriculture, Forest Service 1974). Per the provisions of the Wilderness Act, the Forest Service has completely a review of the wilderness suitability for the Nellie Juan-College Fiord WSA and is currently preparing to make their recommendation to the Secretary of Agriculture.

Esther Island Hatchery - The Esther Island Hatchery is located on the eastern shoreline of Lake Bay on the southern end of Esther Island. The lands on which the existing hatchery facilities are located and the surrounding lands are administered by the State of Alaska. The alternative to expand the Esther Island Hatchery would not affect any existing or proposed wilderness, wilderness study areas, or other national conservation units.

Impact Assessment

Main Bay Alternative - Though the Forest Service has recommended the area around the Main Bay Hatchery as not suitable for wilderness designation, the area is still governed by the provisions of the Wilderness Act and ANILCA until Congress has made their decision to designate the area as wilderness or release if from further review. Subsequently, the expansion of the existing hatcheries facilities will result in further degradation of the natural character of the area and adversely effect wilderness values.

Because of the presence of the existing facilities, the addition of new buildings, roads, and the pipeline would likely not further impair the potential for wilderness designation of adjacent of

lands. In addition, the facilities expansion would occur within the area under the Special Use Permit issued for the existing facilities. **** Dave, is this true?? ****

Specifically, noise and activity associated with construction of the new facilities will intrude on the wilderness value of solitude in the surrounding area. The wilderness experience sought by users of shoreline areas and Main Lake will be significantly degraded during construction. Although short-term, blasting of steep rocky areas to prepare building sites could impact the wilderness recreation experience of users miles away. In addition, the presence of new structures and site disturbances associated with new pipeline would be evident and would further impair wilderness values in the area.

Esther Island Hatchery Alternative - The expansion of the facilities on Lake Bay would not affect the lands managed to preserve wilderness values.

VISUAL RESOURCES

Inventory

Methods

The visual resource inventory was conducted using the guidelines of the Forest Service Visual Management System (U.S. Dept. of Agriculture, Forest Service 1974). Data were collected from the Chugach National Forest Plan and EIS, USGS 15 minute (1:63,360) topographic quadrangle maps, aerial overflight, literature reviews, and personal communications with the Forest Landscape Architect. Field reconnaissance was conducted during February 1992.

A detailed visual resource inventory was compiled to assess the potential visual impacts of the proposed project alternatives. Mapping of variety class, visual sensitivity, and visual quality objectives (VQO's) was obtained from the Chugach National Forest. The visual resources for portions of the Esther Island Hatchery study area have not previously been inventoried. Subsequently, a project-level inventory of variety class, viewpoints and visual sensitivity, and visibility was conducted using the procedures and guidelines of the Visual Management System.

Visual Character Types and Variety Classes - Region 10 of the Forest Service (FS) has conducted an evaluation of the visual character of the landscapes of the southeastern Alaska to establish a frame of reference for implementing variety class inventories. Major topographic or physiographic divisions are the basis of visual character types. Each visual character type consists of a discreet geographic unit of land with distinguishing visual characteristics of landforms, rock formations, waterforms, and vegetative patterns found in the natural landscape. Variety classes describe the inherent scenic values of the natural landscape in context with the visual character type of the regional landscape (U.S. Dept. of Agriculture, Forest Service 1974).

Landscapes are classified into distinct units, or variety classes, that describe the level of scenic value relative to the surrounding area. The greater the diversity of form, line, texture, and color in a landscape unit or area, the greater the potential for high scenic value. Three variety class

designations describe the aesthetic quality of the natural landscape (U.S. Dept. of Agriculture, Forest Service 1974):

Class A - Distinctive: Outstanding areas where characteristic features of landform, rock, water and vegetation are distinctive or unique in the context of the surrounding region. These features exhibit considerable variety in form, line, color, and texture.

Class B - Common: Above average areas in which features provide variety in form, line, color, and texture, and although the combinations are not rare in the surrounding region, they provide sufficient visual diversity to be considered moderately distinctive.

Class C - Minimal: Common areas where characteristic features have moderate-to-little variety in form, line, color, or texture, in relation to the surrounding region.

Visual Sensitivity - Visual sensitivity is the measure of people's concern for visual changes in the natural landscapes of national forests. Three levels of visual of sensitivity identify the different degrees of concern for the visual resource (U.S. Dept. of Agriculture, Forest Service 1974):

High Sensitivity (Level 1) - primary use areas and recreation sites, primary travel routes, and other roads or trails that provide access to nationally significant recreation sites where users would have major concern for the scenic quality

Moderate Sensitivity (Level 2) - primary or secondary use areas and recreation sites and travel routes where fewer than one-forth of the users would have a major concern for the scenic quality

Low Sensitivity (Level 3) - secondary use areas and recreation sites and secondary travel routes, roads and trails where there is little concern for the visual quality

Visual sensitivity levels are determined by evaluating each viewpoint and the seen area by a number of parameters including:

- use volume — the number of potentially sensitive viewers
- user type — some social groups or activities are more likely to be sensitive to what they view
- significance to agency/public — interest groups or agency plans may place special emphasis on key viewpoints

Visibility - Visibility is a measure of how visual changes are perceived in the landscape. Changes in form, line, color, and texture in the landscape become less perceptible with

increasing distance. Visibility is described in terms of three distance thresholds, or zones: foreground, middleground, and background. Each distance zone describes the level of detail or change that can typically be perceived when viewing the landscape. The area not visible from sensitive viewpoints is termed seldom seen. The distance zones are defined as follows:

Foreground	(0 - 1/2 mile) - The portion of the viewed area in which details are perceived and obvious. Foliage and fine textural details of vegetation are normally perceptible within this zone.
Middleground	(1/2 - 3 to 5 miles) - The portion of the viewed area in which details of foliage and fine textures cease to be perceptible and objects in the landscape are perceived mainly by their form. Vegetation appears as outlines or patterns.
Background	(3-5 to 10 miles) - The portion of the viewed landscape where texture and color are weak and landforms become the most dominant element. Background views of the mountain ranges frame the horizon in this landscape. The visual elements of line and form are dominant. Strong color contrasts of sufficient size may still be noticeable.
Seldom Seen	Those areas of the landscape which, because of topographic relief, are screened from the viewpoint, or are beyond 10 miles.

Mapping of the seen area, the area of the landscape visible from sensitive viewpoints, in terms of these distance zones is known as viewshed mapping. Viewshed maps were derived through an analysis of topographic maps supplemented by a review of still photography and videotape taken during field reconnaissance. Visibility also accounts for the viewing conditions) that alter or modify the view of the landscape, including:

- view duration — this is the length of time the subject view is held under typical viewing conditions (e.g., views from residences are typically long duration because they are fixed long-term condition)
- view orientation — views are often directed or focused toward or away from other objects in the view
- viewer position — the position of the viewer relative to the object viewed, looking up or looking down can effect the perception of changes in the landscape
- screening — in mountainous or forested settings the views are often intermittent or partially screened

For example, trees or other vegetation may partially obscure views reducing the visibility of visual changes in the foreground landscape. Or, the project area may be backdropped by distant mountains reducing perceptibility of visual changes in the foreground landscape.

Visual Quality Objectives - The Visual Management System uses three visual resource inventory components to develop visual quality objectives (VQO's): variety class, visibility, and visual sensitivity. The FS uses VQO designations to manage the visual integrity of the landscape. These designations define the acceptable level of change that a proposed project may introduce into the landscape. There are five VQO designations:

Preservation (P)This VQO allows for only "ecological" changes and applies to wilderness areas, primitive ares, other special classified areas, and some unique management units that do not justify other special classification.

Retention (R)	Changes in the landscape must not be visually evident to the casual forest observer. Modifications must repeat form, line, color and texture found in the surrounding natural landscape.
Partial Retention (PR)	Changes in the landscape may be visually evident, but must be integrated into and visually subordinate to the surrounding landscape. Activities may introduce form, line, color, and texture not common in the surrounding landscape, but they should not attract attention.
Modification (M)	Changes in the landscape may visually dominate the surrounding natural landscape; however, they must repeat the naturally established elements of form, line, color, and texture to appear compatible with the natural surroundings.
Max. Modif. (MM)	Management activities may visually dominate the surrounding natural landscape, yet when viewed in the background distance zone,activities must appear as natural occurrences within the landscape. Alterations in foreground and middleground views may be out of scale or introduce visual elements not found in the natural landscape.

Results

This section documents the results of the visual resource inventory for each of the study components (e.g., VQO, scenic quality, etc.). The inventory of visual resources for each of the alternatives, Main Bay Hatchery and Ester Hatchery, is described in terms of the inventory components defined above.

Main Bay Hatchery Alternative

Visual Character and Variety Class - The Main Bay Hatchery is situated at the head of Main Bay on the western coast of Prince William Sound. The landscapes of this area are characteristic of the Kenai visual character type. The area is covered by broken stands of spruce-hemlock forest scattered over steep slopes that rise abruptly from a rocky shoreline around the bay. Background mountain peaks are more densely forested reaching from 1,000-2,000 feet and are often capped with snow and glaciers. The shoreline of Prince William Sound

contains diverse visual character with rock cliffs in some areas and the varied textures of sand, gravel, and broken shale on the beaches areas separated by jagged rock outcrops.

The visual resource inventory of the Chugach National Forest has designated the Main Bay area as variety class A, or distinctive. The outstanding features of form and texture along the rocky shoreline are complemented by the scenic waterforms of Main Lake and Main River. Main River drops rapidly over 200 feet in elevation through a series of highly scenic waterfalls, chutes, and pools from Main Lake, a deep clear freshwater lake, and empties into Main Bay.

Visual Sensitivity - The visual sensitivity of viewers in Main Bay was inventoried as sensitivity level 2. This level of visual sensitivity indicates that fewer than one-forth of the users of primary use areas (e.g., WSA) and waterbodies have a major concern for scenic values of the landscape around them. Main Bay is occasionally used by recreation boaters, kayakers, and backcountry users that enter the bay for sportfishing or to access shoreline areas. The area around Main Lake was inventoried as sensitivity level 3 because it receives very occasional use by hunters, fishermen, and hikers.

Visibility - Main Bay Hatchery is not visible to middleground or background views from the bay. Though the existing hatchery facilities are visible to foreground views from the bay, structures are largely screened from view by a stand of trees that cover a large rock outcrop. The building that houses the new hatchery and bunkhouse is visible through a gap that provides access from facilities to the bay. Holding pens and docks are also visible to foreground views. The residences and other structures are visible only from the extreme head of the bay adjacent to the hatchery facilities.

Visual Quality Objectives (VQO) - The area around the existing hatchery facilities and along the shoreline is managed by the Chugach National Forest with a VQO of Partial Retention. This VQO requires that activities remain visually subordinate to the characteristic landscape. Partial Retention allows changes in the landscape that may be visually evident, but must repeat the form, line, texture, and color of the surrounding landscape.

Esther Island Hatchery Alternative

Because the Esther Island Hatchery is located on lands administered by the State of Alaska, a detailed visual resource inventory is not available for this alternative. Therefore, a project-level inventory was conducted based on data compiled from topographic maps, site photography, aerial overflight, and field reconnaissance. The results of this inventory are described below using the FS terms defined previously.

Visual Character - The Esther Island Hatchery is situated on the eastern shoreline midway into Lake Bay on the southern end of Esther Island in Prince William Sound. Similar to Main Bay, this area is characteristic of the Kenai visual character type. Broken stands of spruce-hemlock forest are interspersed with rock outcrops on the steep slopes that rise abruptly from the jagged rocky shoreline around the bay. The existing hatchery facilities are located on an area of rock fill placed in a cove just below Esther Lake. The landscape surrounding the Esther Island

Hatchery contains variety in landforms, waterforms, and vegetation patterns similar characteristic of landscape around Main Bay that the FS lands has designated as variety class A.

Visual Sensitivity - The visual sensitivity of viewers in Lake Bay is expected to be similar that described for Main Bay. Specifically, that fewer than one-forth of the users of primary use areas and waterbodies have a major concern for scenic values of the landscape. Similar to Main Bay, recreation users (e.g., boaters, kayakers, fishermen, etc.) occasionally enter Lake Bay for sportfishing or to access shoreline areas and would be sensitive to the visual intrusions of the existing development.

Visibility - Buildings and other structures at the Esther Island Hatchery are openly visible to foreground views from on Lake Bay. The existing facilities tend to suddenly dominate views from the bay once viewers reach a point approximately one-quarter mile away from the hatchery. Two parallel water pipelines are quite noticeable where they descend a steep rocky slope from Esther Lake to the hatchery. Holding pens and docks are also visible to foreground views from the bay. The existing hatchery facilities are not visible to middleground or background views from Wells Passage in Prince William Sound.

Visual Quality Objectives (VQO) - Because the State of Alaska has no system for the management of visual resources on state lands, there is no VQO for the landscapes around the Esther Island Hatchery. However, it should be noted the visual conditions around Lake Bay and the existing hatchery facilities are quite similar to those found at Main Bay Hatchery.

Impact Assessment

<u>Methods</u>

The impact assessment determined the potential visual effects expected to result from the expansion of fish hatchery facilities. The analysis addressed potential visual effects of project alternatives on: (1) views from sensitive viewpoint (e.g., boaters, dispersed recreation users), (2) the scenic or aesthetic quality of the landscape, and (3) compliance with the visual quality objectives (VQO's).

Potential adverse visual effects were determined through an analysis based on a measure of the visual contrast, the relative visual change in the landscape, and visibility, how that change is perceived by sensitive viewers.

Visibility was used to evaluate how a viewer perceives visual contrasts in the context of the landscape. Landform (terrain) and vegetative screening, superior or inferior viewer position (looking down or looking up), distance zone (distance between viewer and proposed project), and the duration of view (length of viewing time) may affect how a viewer perceives the landscape from a particular viewpoint.

Visual contrast was determined by considering soil color characteristics, vegetation types and patterns, and the presence or absence of existing contrasting elements in the landscape. Further,

the inherent ability of the natural landscape to absorb visual change was considered in determining visual contrast levels. Strong visual contrasts typically attract the attention of casual observers or dominant the view. Removal or disturbance of trees or other vegetation may result in strong visual contrasts. Large differences in soil color in areas disturbed by construction activities can also result in strong visual contrasts. In context with the proposed project, strong visual contrasts would occur where clearing for roads, water pipelines, or building sites in the natural landscape.

Three visual contrast levels (strong, moderate, and weak) describe the degree of visual change expected to occur in the project area. These contrasts levels are based on the disturbances predicted to result from project alternatives. The level of visual contrast and the visibility of that contrast from sensitive viewpoints are combined to determine the potential visual impacts to viewers. The visual analysis evaluated how the magnitude of change that project alternatives would introduce into the landscape (e.g., structures, tree removal, construction disturbance, soil exposure, etc.) would be perceived from sensitive viewpoints.

Three impact levels are used to describe potential visual impacts:

High	visual impacts that are easily noticed by the average forest user; modifications to the visual setting that dominate the view
Moderate	visual impacts that are not readily noticed (visually co-dominant) in the landscape setting; though noticeable by the average Forest user, modifications do not dominate the view
Low	visual impacts that may be easily overlooked by the average Forest user; modifications are subordinate in the visual setting and may blend with the view

Significant visual impacts (high) typically occur when major visual changes are noticeable from sensitive viewpoints (sensitivity level 1 or 2) in landscapes that are homogeneous and contain little variety and diversity. Visual changes visible to middleground and background views are usually less obvious unless the change is to a focal point or local landmark.

Similar to the assessment of viewer impacts, visual contrast levels were also used to determine whether or not project alternatives comply with adopted VQO's. The visual analysis compared the level of visual contrast expected to result from each of the project alternatives with the VQO designations (previously described).

<u>Results</u>

Main Bay Alternative

Viewers Impacts - The placement of structures in the natural landscape typically results in strong visual contrasts. However, because the new hatchery building and ancillary structures would be constructed adjacent to existing structures, weak to moderate visual contrasts are

expected to result. These contrasts would occur from site clearing and tree removal for building sites and roads. Views from Main Bay are largely screened by a large tree-covered rock outcrop. The new hatchery building would be likely be entirely screened to views from Main Bay, except a the extreme head of the bay adjacent to the existing facilities. The new bunkhouse and warehouse would be situated behind the existing hatchery building and would be partially to fully screened to views from Main Bay. Because so little of the area is visible, the visual contrasts from the construction activities and new structures would result in low to moderate impacts to foreground views from boaters and other recreation users in Main Bay.

The construction of a new water pipeline from Main Lake to the new hatchery building would result in moderate to strong contrasts in the lake area. These contrasts would result in moderate to high impacts to views from occasional backcountry users in the Main Lake area.

The use of colors, textures, and construction materials compatible with those used in the construction of the existing facilities will reduce visual contrasts associated with new facilities at the Main Bay Hatchery. In addition, the placement of structures on the site to take greatest advantage of potential screening by landforms and vegetation will also minimize visual contrasts.

Compliance with VQO's - The expansion of facilities at Main Bay Hatchery would result in some moderate visual contrasts. However, the site is somewhat screened to sensitive views from Main Bay by tree cover and rock outcrops and the causal observer would notice only small changes in the existing landscape. These visual contrasts would be evident, but would be visually subordinate in the characteristic landscape. With careful construction, minimizing the removal of trees, and the use of compatible colors and textures in construction materials, the proposed expansion of the Main Bay Hatchery would comply with the VQO of Partial Retention.

Esther Island Hatchery Alternative

Viewers Impacts - Expansion of the existing facilities at the Esther Island Hatchery would be openly visible to boaters and other recreation users that enter Lake Bay. Typically, the presence of structures in the natural landscape results in strong visual contrasts. However, because the new hatchery building and other ancillary structures would be placed adjacent to the existing Esther Island Hatchery facilities, weak to moderate visual contrasts are expected to result. As no trees would likely have to be removed, the placement of an additional water pipeline from Esther Lake to the new facilities would result in moderate visual contrasts. Because of the visual contrasts associated with the existing hatchery facilities, moderate visual impacts are expected to occur. These impacts would occur where the construction activities and new structures are visible to foreground views from boats and other users in Lake Bay and along the bay's shoreline.

The visual contrasts of the new facilities can be reduced somewhat by matching the color, texture, and materials used in the construction of the existing facilities. Where possible, new structures should be sited to take advantage of screening by existing structures.

Compliance with VQO's - Because the Esther Island Hatchery alternative is entirely located on state-administered lands, there would be no effect on VQO's by this alternative.

REFERENCES

Public Law 96-487. Alaska National Interest Lands Conservation Act of 1980.

Public Law 88-577. Wilderness Act of 1964.

USDA. Forest Service. 1974. National Forest Landscape Management Volume 2. Chapter 1, The Visual Management System.

Wahrhaftig, Clyde. 1965. The Physiographic Divisions of Alaska. Geological Survey, U.S. Department of the Interior.

APPENDIX 3-5

STATE OF ALASKA

DEPARTMENT OF NATURAL RESOURCES

DIVISION OF PARKS

JAY S. HAMMOND, GOVERNOR

Division of Parks
619 Warehouse Dr., Suite 210
Anchorage, Alaska 99501

January 23, 1978

Re: 1120-8

Ms. Norma Dudiak
Dept. of Fish & Game
F.R.E.D. Division
P.O. Box 234
Homer, Alaska 99603

Dear Ms. Dudiak:

In response to your request of January 6, 1978 for information on known historical and archaeological sites that might be affected by the proposed Main Bay Fish Hatchery construction project I have the following: there are no <u>known</u> historical or archaeological sites in the vicinity of the proposed hatchery. However, the area of the proposed hatchery has never received a thorough archaeological reconnaisance. A brief reconnaisance of the general area, conducted in the 1930's, revealed a prehistoric village site and a prehistoric burial cave with human remains, faunal remains, stone tools and a three foot deep midden or refuse heap within four to five miles of the proposed hatchery site. We therefore recommend that an archaeological survey of the proposed Main Bay Fish Hatchery site be conducted prior to any construction related ground disturbances.

Sincerely,

Terry McWilliams
Director

William S. Hanable

By: William S. Hanable
Chief, History & Archaeology

GD/jan

UNITED STATES DEPARTMENT OF AGRICULTURE
FOREST SERVICE
Chugach National Forest
Pouch 6606
2221 E. Northern Lights Blvd., Suite 230
Anchorage, Alaska 99502

1? JUL 1978

2360

Mr. Dave Daisy
Regional Project Manager
State of Alaska Dept. of Fish & Game, F.R.E.D.
333 Raspberry Road
Anchorage, AK 99502

Dear Mr. Daisy:

As per your letter of May 15, 1978 to Mr. Clay Beal, Forest Supervisor, an archaeological survey was conducted at your proposed aquaculture site on Main Bay, Chugach Nation Forest, Prince William Sound, Alaska on May 23, 24, and 25, 1978.

No cultural resources were located as a result of that survey. Examination of soil samples collected by geologist Dee High, D.O.W.L. engineering consultants helped verify this conclusion. My records of the Alaska Heritage Resources Survey indicate no sites in that area but it would be advisable to consult directly with Mr. William Hanable, State Historic Preservation Officer, for clearance from his office also. A background search of existing literature and the National Register of Historic Places (F.R., Vol. 43, No. 26 - Tuesday, February 7, 1978) and subsequent additions show no cultural resources for the area in question.

A special provision will be stipulated in your Special Use Permit for development of the site to the effect that; if cultural resources are discovered during your work, all operations will cease and the forest archaeologist will be contacted immediately. Also, all antiquities so discovered become the property of the U.S. Government.

I am most grateful to Mr. Dick Nickerson and Mr. Dan Dougherty for their helpful cooperation and hospitality during my stay aboard the "O'Keta" and for providing a .375 H. & H. magnum calibre rifle for the security of the survey.

Sincerely,

John L. Mattson

JOHN L. MATTSON
Archaeologist

6200-11 (1 53)

CULTURAL RESOURCE CONSULTANTS
3504 E. 67th Avenue
Anchorage, Alaska 99507
(907) 349-3445

Main Bay Hatchery

An archeological survey of the existing Main Bay Hatchery facility was conducted in 1978 by John Mattson of the U.S. Forest Service. According to Mattson (1978), "no cultural resources were located as a result of [this] survey." He also noted that "a background search of existing literature and the National Register of Historic Places...show[s] no cultural resources for the area in question." Mattson (personal communication, 1992) briefly inspected a road and a bulldozed "platform" at the hatchery in 1990, but again found no cultural remains. Exxon archeologists surveyed much of the shore of Main Bay during 1989 and 1990, although they apparently did not work within containment booms protecting the head of the bay (Chris Wooley, personal communication, 1992).

The only known site in Main Bay listed on the Alaska Heritage Resources Survey is SEW-206. Also known as the Main Bay Summer Camp, this site, located on the peninsula at the northern entrance to the bay, consists of eight bark-stripped hemlock trees.

References Cited

Mattson, John L.
1978 Letter to Dave Daisy, Regional Project Manager, State of Alaska Department of Fish and Game. On file, Alaska Division of Parks, Office of History and Archaeology, Anchorage.

Individuals Contacted

John Mattson, Forest Archeologist, Chugach National Forest

Chris Wooley, Assistant Director, Exxon Cultural Resources Program

CULTURAL RESOURCE CONSULTANTS
3504 E. 67th Avenue
Anchorage, Alaska 99507
(907) 349-3445

May 28, 1992

Cultural Resources

Lake Bay on Esther Island has never been archeologically surveyed. There are, therefore, no known sites in the vicinity of the Wally Noerenberg Hatchery listed in the Alaska Heritage Resources Survey. However, according to Chugach National Forest archeologist John Mattson (personal communication, 1992), the hatchery site has little archeological potential.

APPENDIX 3-6

ADF&G TABLE 7. HOUSEHOLD AND PER CAPITA LEVELS OF RESOURCE HARVEST AND USE, CHENEGA BAY 1985-86 (n=15)

Resource[a]	Total Number Harvested	Total Pounds Harvested	Household Harvest	Per Capita Harvest[b]	Total Number Used	Total Pounds Used	Household Use	Per Capita Used[b]
King Salmon	43.0	838.5	55.9	15.5	34.5	672.8	44.9	12.5
Red Salmon	172.0	705.2	47.0	13.1	167.5	686.8	45.8	12.7
Pink Salmon	286.0	686.4	45.8	12.7	321.5	771.6	51.4	14.3
Chum Salmon	116.0	742.4	49.5	13.7	93.0	595.2	39.7	11.0
Silver Salmon	185.0	1,313.5	87.6	24.3	162.5	1,153.8	76.9	21.4
Halibut	NA[c]	2,335.0	155.7	43.2	NA[c]	1,459.0	97.3	27.0
Herring	70.0g[d]	224.0	14.9	4.1	47.4g[d]	151.5	10.1	2.8
Gray Cod	29.0	116.0	7.7	2.1	10.0	40.0	2.7	.7
Black Cod	10.0	31.0	2.1	0.6	5.0	15.5	1.0	.3
Red Rockfish	59.0	236.0	15.7	4.4	51.0	204.0	13.6	3.8
Black Rockfish	4.0	16.0	1.1	.3	4.0	16.0	1.1	.3
Herring Roe	15.0g	105.0	7.0	1.9	21.4g	149.8	10.0	2.8
Smelt/Eulachon	18.0g	57.6	3.8	1.1	16.3g	52.0	3.5	1.0
Shark	NA	4.0	.3	.1	NA	4.0	.3	.1
Eel	1.0	2.0	.1	--[e]	1.0	2.0	.1	--[e]
Dolly Varden	72.0	64.8	4.3	1.2	57.0	51.3	3.4	1.0
Trout	100.0	140.0	9.3	2.6	60.0	84.0	5.6	1.6
Razor Clams	16.0g	25.6	1.7	.5	16.0g	25.6	1.7	.5
Other Clams	53.0g	50.0	3.3	.9	51.0g	47.5	3.2	.8
Cockles	3.9g	3.9	.3	.1	3.9g	3.9	.3	.1
Mussels	5.5g	5.5	.4	.1	5.5g	5.5	.4	.1
Octopus	13.3	53.0	3.5	1.0	16.5	66.0	4.4	1.2
Chiton	6.4g	25.4	1.7	.5	11.9g	47.4	3.2	.9
Dungeness Crab	4.0	2.8	.2	.1	0	0	0	0
King Crab	18.0	41.4	2.8	.8	108.0	248.4	16.6	4.6
Tanner Crab	0	0	0	0	51.0	81.6	5.4	1.5
Shrimp	NA	55.5	3.7	1.0	NA	485.2	32.3	9.0

(continued)

ADF&G TABLE 7. (Continued) HOUSEHOLD AND PER CAPITA LEVELS OF RESOURCE HARVEST AND USE, CHENEGA BAY 1985-86 (n=15)

Resource[a]	Total Number Harvested	Total Pounds Harvested	Household Harvest	Per Capita Harvest[b]	Total Number Used	Total Pounds Used	Household Use	Per Capita Used[b]
Sea Lion[f]	25.0	2,500.0	166.7	46.3	NA[c]	965.0	64.3	17.9
Sea Otter[f]	15.0	15.0	.9	.3	NA	1.5	.1	--[e]
Harbor Seal[f]	145.0	5,481.0	342.6	96.2	NA	1,594.6	99.7	28.0
Deer[f]	73.0	2,920.0	182.5	51.2	NA	2,857.0	178.6	50.1
Moose[f]	1.0	500.0	31.3	8.8	NA	316.0	19.8	5.5
Black Bear[f]	10.0	580.0	36.3	10.2	NA	338.0	21.1	5.9
Goat	2.0	140.0	9.3	2.6	NA	119.0	7.9	2.2
Porcupine	6.0	27.0	1.8	.5	6.0	27.0	1.8	.5
Geese	6.0	30.0	2.0	.6	8.0	40.0	2.7	.7
Ducks[d]	142.0	213.0	13.3	3.7	115.0	172.5	10.8	3.0
Grouse[d]	40.0	20.0	1.3	.4	34.0	17.0	1.1	.3
Bird Eggs	30.0	1.5	.1	--[e]	15.0	.8	.1	--[e]
Land Otter[f]	29.0	NA[c]	NA[c]	NA[c]	29.0	NA[c]	NA[c]	NA[c]
Mink[f]	17.0	NA	NA	NA	18.0	NA	NA	NA
Weasel[f]	1.0	NA	NA	NA	1.0	NA	NA	NA
Berries	58.5g	234.0	15.6	4.3	69.1g	276.4	18.4	5.1
Plants	NA	34.0	2.3	.6	NA	18.0	1.2	.3
Wood	153.0c[g]	NA	NA	NA	135.0c[g]	NA	NA	NA
Total[f]		20,576.0	1,286.0	361.0		13,863.0	866.4	243.2

a See Appendix G for complete list of species and scientific names.
b Per capita where household n=15 reflects 54 individuals, and 57 individuals where n=16.
c NA: Not applicable, either only pounds were recorded or resource was used, but not consumed.
d g: gallons.
e --: less than .1 pound.
f n=16 households.
g c: cords.

SOURCE: STRATTON & CHISUM 1986: 66-67

Draft Environmental Impact Statement for the Main Bay Salmon Hatchery Expansion

Prince William Sound
Chugach National Forest
Alaska

ERRATA

August 1993

United States
Department of
Agriculture

National Agricultural Library

Dear Reader: August 20, 1993

The following four chapters were inadvertently omitted from the ***Main Bay Hatchery Expansion Draft Environmental Impact Statement***, which was released August 6, 1993:

ERRATA

CHAPTER 5.0	**PREPARERS OF THE DRAFT EIS**
CHAPTER 6.0	**GLOSSARY**
CHAPTER 7.0	**LITERATURE CITED**
CHAPTER 8.0	**INDEX**

ANNOUNCEMENT OF PUBLIC MEETING

A public meeting has been scheduled for Tuesday, September 21st at the Loussac Library Public Conference Room regarding the Draft Environmental Impact Statement (DEIS). The meeting will begin at 7:30 pm and is intended to receive comments on the DEIS as part of the public comment period. Written comments received by October 10, 1993 will also be addressed in the final EIS.

5.0 PREPARERS OF THE DRAFT EIS

5.0 PREPARERS OF THE DRAFT EIS

The following is a list of those who prepared the draft Environmental Impact Statement.

Preparers:

David Schmidt	Senior Fisheries Biologist BS., Biology, University of Kansas MA., Aquatic Ecology, University of Kansas Dames & Moore: 3.5 years Marine and Anadromous Fish Ecology Freshwater Fish Ecology NEPA and NRDA Process Permitting Issues Commercial Fishing Issues Other Employment: LGL Alaska Research Associates, 9 years.
Michael Fitzgerald	Environmental Scientist BA., Environ. Studies, Environ. Economics University of California, Santa Barbara Dames & Moore: 2 years Terrestrial Ecology Permitting Issues NEPA Process Environmental Economics
Jim Hemming	Manager, Alaska Operations BS., Wildlife Technology, University of Montana MS., Zoology, University of Montana Dames & Moore: 15 years Management of Interdisciplinary Projects Environmental Permitting/Monitoring Arctic/Subarctic Biology

Jim Richardson	Resource Economist BA., Economics, University of Calgary MS., Agricultural & Resource Economics, Oregon State University Resource Econ: 10 years Regional Impact Analysis Fisheries Economics Commercial Fishing Industry
Jon Isaacs	Socioeconomist Jon Isaacs and Associates Planning Economics Transportation Coastal Management
Steve Braund	Subsistence Resources Steve Braund and Associates Subsistence Resource Issues Site Assessments Commercial Fishing Issues
Mike Yarborough	Archeologist BA., University of Arkansas MA., University of Toronto Cultural Resource Consultants: 12 years Pre-construction Archeological Surveys Cultural Resource Literature Reviews Section 106 Reviews

6.0 GLOSSARY

6.0 GLOSSARY

ADF&G:	Alaska Department of Fish and Game.
AGZ:	Alternating Gear Zone. A commercial fishing area where a variety of gear types can be alternately used.
broodstock:	Mature adult fish captured, usually at the hatchery site, and used as spawning stock for the hatchery.
cfs:	Cubic feet per second. A measure of the flow of water. 1 cfs = 449 gallons per minute.
coded wire tag:	A small wire segment, with uniquely coded notches along its length, that is implanted under the skin on the nose salmon fry. The tag is recovered after the fish grow to adult size. Tagging fish in this way provides hatchery operators with information about the proportion of fry that live to return as adults.
cost recovery:	Capture and sales of returning adult salmon conducted by a hatchery operator to recover the costs associated with operations.
eggtake:	The stripping or squeezing of eggs from a female salmon and adding sperm from male salmon for artificial fertilization and incubation purposes.
escapement:	For wild stock salmon: that portion of the returning adult salmon not harvested for consumptive, recreational, or commercial purposes; and survives to enter spawning streams. For hatchery produced salmon: that portion of the returning adult salmon used for hatchery cost recovery and broodstock.
ex vessel:	Gross price paid to a fisherman upon sale of fish to a processor or other buyer before tax or any other deductions.
eyed egg:	An egg that is developed to the point where the eye spot is visible. Eggs at this stage are relatively resistant to mechanical shock.
F_1:	The first generation of fry that were spawned from wild stock salmon.
FRED:	Fisheries Rehabilitation, Enhancement, and Development. A Division of the Alaska Department of Fish and Game.

fry:	Immature salmon, usually less than 50 mm in length, that have just started feeding.
IHN or IHNV:	Infectious hematopoietic necrosis virus. A naturally occurring water-borne virus that can infect and kill salmon eggs and fry. Prevalent and naturally occurring in wild stocks of several species of salmon.
incubator:	Trays or racks plumbed to a flow-through water source and used to incubate and hatch salmon eggs.
MLLW:	Mean Lower Low Water. The zero mark on the tide height scale.
off-station:	The imprinting, rearing, and release of fry or smolt at a remote location away from the hatchery site.
oligotrophic:	Referring to a body of water that is generally low in nutrients.
on-station:	The release of fry or smolt at the hatchery site.
production:	The number of returning adult salmon that can be used for hatchery cost recovery, broodstock, or commercial harvest.
PWS:	Prince William Sound, Alaska
PWSAC:	Prince William Sound Aquaculture Corp.
raceway:	A hatchery enclosure used to rear immature salmon. The raceway is equipped with freshwater flow-through capabilities.
rear:	To raise immature salmon from the fry stage to the smolt stage. This process usually involves maintaining and feeding the fish in enclosures or raceways.
returns:	The total number of adult salmon returning from the ocean toward their release site or their natal streams. This number includes both escapement and harvest returns.
salmonid:	Any member of the family of fishes that includes salmon, trout, and char.
SAS:	Smolt to adult survival. Usually the percentage of salmon smolt entering the marine system that return as adults.

SHA:	Special Harvest Area. A designated area where hatchery returns are harvested by the hatchery operators, and, in some situations by the common property fishery.
smolt:	Immature salmon, usually between 80 and 120 mm in length, that are ready to leave freshwater and begin the marine portion of their life cycle.
start tank:	Tanks used to contain newly emerged salmon fry for feeding and rearing purposes.
stock:	A reproductively isolated group of salmon usually returning to spawn during the same time each year, and occupying the same spawning stream or system of streams.
THA:	Terminal Harvest Area. A designated area where hatchery returning adult salmon have achieved a reasonable degree of segregation from wild stocks and may be harvested by the common property fishery.
USDA:	United States Department of Agriculture.
USFWS:	United States Fish and Wildlife Service.

7.0 LITERATURE SITED

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